Dr. N.G.P.ARTS AND SCIENCE COLLEGE (Autonomous)

REGULATIONS 2019-20 for Post Graduate Programme

(Outcome Based Education model with Choice Based Credit System)

M.Sc. Computer Science Degree

(For the students admitted during the academic year 2021-22 and onwards)

Programme: M.Sc. Computer Science

Eligibility

Candidates for admission to the first year course leading to the Degree of Master of Science (COMPUTER SCIENCE) will be required to possess a pass in B.Sc. Computer Science / B.C.A. / B.Sc. Computer Technology / B.Sc. Information Technology / B.Sc. Information Sciences / B.Sc. Information Systems / B.Sc. Software Systems / B.Sc. Software Sciences / B.Sc. Applied Sciences (Computer Science / Computer Technology) / B.Sc. Electronics of any University in Tamil Nadu or an Examination accepted as equivalent thereto by the Academic Council, subject to such conditions as may be prescribed thereto are permitted to appear and qualify for the M.Sc. Computer Science Examination of this College after the programme of study of two academic years.

Programme Educational Objectives

The Curriculum is designed to attain the following learning goals which students shall accomplish by the time of their graduation:

1. To embrace future developments and professional relevance in Computer Science.
2. To attain agility in advanced programming languages and software building for wide area of applications.
3. To explore with applications of Internet Technologies in the related profession with social and ethical responsibilities.
4. To handle the current techniques, skills and tools necessary for computing practice.
5. To engage in research oriented activities and life-long learning for continuing professional development.

PROGRAMME OUTCOMES:

On the successful completion of the program, the following are the expected outcomes.

PO Number	PO Statement
PO1	The ability to identify and analyze the requirements of Computer Science problems.
PO2	The understanding of professional and ethical responsibility in the field of computer science and to communicate effectively.
PO3	The ability to implement algorithms and paradigms with modern software tools.
PO4	The ability to function effectively on multi-disciplinary projects and problems.
PO5	The ability to recognize and respond towards research areas of computer science and the need for lifelong learning.

TOTAL CREDIT DISTRIBUTION

Part	Subjects	No.of Papers	Credit	Semester No.
III	Core (Credits 4)	18-22	74	I to IV
	Extra Departmental Course (EDC)	1	4	III
	Discipline Specific Elective (DSE)	3	3 x 4 =12	I to III
TOTAL CREDITS			**90**	

CURRICULUM

M.Sc. COMPUTER SCIENCE PROGRAMME

Course Code	Course Category	Course Name	L	T	P	Exam (hours)	Max Marks			Credits
							CIA	ESE	Total	
First Semester										
Part – III										
194CS2A1CA	Core – I	Relational Database Management System	4	-	-	3	25	75	100	4
194CS2A1CB	Core – II	Advanced Java Programming	4	-	-	3	25	75	100	4
194CS2A1CC	Core - III	Cloud Computing	4	-	-	3	25	75	100	4
194CS2A1CD	Core - IV	Internet of Things	4	-	-	3	25	75	100	4
204CS2A1CP	Core Practical - I	Relational Database Management System	-	-	5	3	40	60	100	2
204CS2A1CQ	Core Practical – II	Advanced Java Programming	-	-	5	3	40	60	100	2
194CS2A1DA	DSE – I	Advanced Computer Architecture	4	-	-	3	25	75	100	4
194CS2A1DB		Object Oriented Analysis and Design								
194CS2A1DC		Mobile Computing								
Total			**20**	**-**	**10**				**700**	**24**

BoS Chairman/HoD
Department of Computer Science
Dr N. G. P. Arts and Science College
Coimbatore – 641 048

Dr.N.G.P. Arts and Science College
APPROVED
BoS - 11th 15/5/21 | AC - 11th 9/8/21 | GB - 15th 17/8/21

Academic Council
Dr.N.G.P. Arts and Science College
CHAIRMAN

Dr.NGPASC
COIMBATORE | INDIA

Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
Second Semester										
Part - III										
194CS2A2CA	Core - V	Design and Analysis of Algorithms	4	0	0	3	25	75	100	4
194CS2A2CB	Core - VI	Internet Programming	4	0	0	3	25	75	100	4
194CS2A2CC	Core - VII	Network Security	4	0	0	3	25	75	100	4
204CS2A2CP	Core Practical - III	Design and Analysis of Algorithms	0	0	5	3	40	60	100	2
204CS2A2CQ	Core Practical - IV	Internet Programming	0	0	5	3	40	60	100	2
194IT2A2EA	EDC	Digital Marketing	4	0	0	3	25	75	100	4
194CS2A2DA	DSE - II	Wireless Networks	4	0	0	3	25	75	100	4
194CS2A2DB		Principles of Programming Languages								
194CS2A2DC		Augmented Reality & Virtual Reality								
Total			**20**	**-**	**10**	**-**	**-**	**-**	**700**	**24**

Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
Third Semester										
Part III										
194CS2A3CA	Core - VIII	Open Source Technology	4	-	-	3	25	75	100	4
194CS2A3CB	Core - IX	Big Data Analytics	4	-	-	3	25	75	100	4
194CS2A3CC	Core – X	Software Project Management	4	-	-	3	25	75	100	4
194CS2A3CD	Core - XI	Research Methodology	4	-	-	3	25	75	100	4
194CS2A3CP	Core Practical - V	Open Source Technology	-	-	5	3	40	60	100	2
194CS2A3CQ	Core Practical - VI	Big Data Analytics using R	-	-	5	3	40	60	100	2
194CS2A3DA	DSE - III	Machine Learning	4	-	-	3	25	75	100	4
194CS2A3DB		Soft Computing								
194CS2A3DC		Distributed Operating System								
Total			**20**	**-**	**10**				**700**	**24**

Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
Fourth Semester										
Part – III										
194CS2A4CA	Core- XII	Android Programming	4	1	0	3	25	75	100	4
194CS2A4CB	Core-XIII	Web Intelligence	4	0	0	3	25	75	100	4
194CS2A4CP	Core Practical -VII	Android Programming	0	0	5	3	40	60	100	2
194CS2A4CV	Core-XIV	Core Project	0	0	16	3	80	120	200	8
		Total	**8**	**1**	**21**	**-**	**-**	**-**	**500**	**18**
Grand Total									**2600**	**90**

DISCIPLINE SPECIFIC ELECTIVE

Students shall select the desired course of their choice in the listed elective course during Semesters I, II & III

Semester I (Elective I)

List of Elective Courses

S. No.	Course Code	Name of the Course
1.	194CS2A1DA	Advanced Computer Architecture
2.	194CS2A1DB	Object Oriented Analysis and Design
3.	194CS2A1DC	Mobile Computing

Semester II (Elective II)

List of Elective Courses

S. No.	Course Code	Name of the Course
1.	194CS2A2DA	Wireless Networks
2.	194CS2A2DB	Principles of Programming Languages
3.	194CS2A2DC	Augmented Reality & Virtual Reality

Semester III (Elective III)

List of Elective Courses

S. No.	Course Code	Name of the Course
1.	194CS2A3DA	Machine Learning
2.	194CS2A3DB	Soft Computing
3.	194CS2A3DC	Distributed Operating System

EXTRA CREDIT COURSES

The following are the courses offered under self study to earn extra credits:

S. No.	Course Code	Course Name
1	194CS2ASSA	IPR and Entrepreneurship
2	194CS2ASSB	Organisational Behaviour

Regulation
(2019-2020)

PG Programme

Effective from the academic year 2019-20 and applicable to the students admitted to the Degree of Master of Arts/Commerce/Management/Science.

1. NOMENCLATURE

1.1 Faculty: Refers to a group of programmes concerned with a major division of knowledge. Eg. Faculty of Computer Science consists of Programmes like Computer Science, Information Technology, Computer Technology, Computer Applications etc.

1.2 Programme: Refers to the Master of Arts/Management/Commerce/Science Stream that a student has chosen for study.

1.3 Batch: Refers to the starting and completion year of a programme of study. Eg. Batch of 2015–2017 refers to students belonging to a 2-year Degree programme admitted in 2015 and completing in 2017.

1.4 Course: Refers to a component (a paper) of a programme. A course may be designed to involve lectures / tutorials / laboratory work / seminar / project work/ practical training / report writing / Viva voce, etc or a combination of these, to effectively meet the teaching and learning needs and the credits may be assigned suitably.

a) **Core Courses**

A course, which should compulsorily be studied by a candidate as a core requirement is termed as a Core course.

b) **Extra Departmental Course (EDC)**

A course chosen generally from a related discipline/subject, with an intention to seek exposure in the discipline relating to the core domain of the student.

c) **Discipline Specific Elective Course (DSE)**: DSE courses are the courses offered by the respective disciplinary/ interdisciplinary programme.

d) Project Work:

It is considered as a special course involving application of knowledge in problem solving/analyzing/exploring a real-life situation. The Project work will be given in lieu of a Core paper.

e) Extra credits

Extra credits will be awarded to a student for achievements in co-curricular activities carried out outside the regular class hours. The guidelines for the award of extra credits are given in section two, these credits are not mandatory for completing the programme.

e) Advanced Learner Course (ALC):

ALC is doing work of a higher standard than usual for students at that stage in their education. Research work carried out in University/ Research Institutions/ Industries of repute in India or abroad for a period of 15 to 30 days.

2. EXTRA CREDITS

- Earning extra credit is mandatory. However, it is not essential for programme completion.
- Extra Credits will be awarded to a student for achievement in co-curricular/ extracurricular activities carried other than the regular class-hours.
- A student is permitted to earn a maximum of 10 extra Credits during the programme duration of PG from I to IV Semester.
- Candidate can claim a maximum of 1 credit under each category listed.

The following are the guidelines for the award of Extra credits:

2.1 Proficiency in Foreign Language

Qualification	Credit
A pass in any foreign language in the examination conducted by an authorized agency	1

2.2 Proficiency in Hindi

Qualification	Credit
A pass in the Hindi examination conducted by Dakshin Bharat Hindi Prachar Sabha	1

Examination passed during the programme period only will be considered for extra credit

2.3 Self-study Course

Qualification	Credit
A pass in the self-study courses offered by the department	1

The candidate should register in the self-study course offered by the department only in the III semester

2.4 Typewriting/Short hand

A Pass in shorthand /typewriting examination conducted by Tamil Nadu Department of Technical Education (TNDTE) and the credit will be awarded.

Qualification	Credit
A pass in the type writing /short hand examination offered by TNDTE	1

2.5 Diploma / Certificate

Courses offered by any recognized University / NCVRT

Qualification	Credit
A pass in any Certificate /Diploma/PG Diploma Course	1

2.6 CA /ICSI/ CMA

Qualification	Credit
Qualifying foundation/Inter level/Final in CA/ICSI/CMA etc.	1

2.7 Sports and Games

The Student can earn extra credit based on their achievement in sports as given below:

Qualification	Credits
Achievement in University/State /National/ International	1

2.8 Online Courses

Pass in any one of the online courses

Qualification	Credit
SWAYAM/NPTEL/Spoken Tutorial etc.,	1

2.9 Publications / Conference Presentations (Oral/ Poster) /Awards

Qualification	Credit
Research Publications in Journals/oral/poster presentation in Conference	1

2.10 Innovation / Incubation / Patent / Sponsored Projects / Consultancy

Qualification	Credit
Development of model/ Products/ Prototype/ Process/App/Registration of Patents/ Copyrights/ Trademarks/Sponsored Projects/Consultancy	1

2.11 Representation

Qualification	Credit
Participation in State / National level celebrations such as Independence day, Republic day Parade, National Integration camp etc.,	1

3. EXAMINATIONS

The following are the distribution of marks for External and Internal i.e., Comprehensive examination and Continuous Internal Assessment and passing minimum marks for theory papers of PG programmes.

TOTAL MARKS	EXTERNAL		Internal Max. marks	Overall Passing Minimum for total marks (Internal + External)
	Max. marks	Passing Minimum for External alone		
100	75	38	25	50
50	50	25	----	25

The following are the Distribution of marks for the Continuous Internal Assessment in the theory papers of PG programmes.

S. No.	For Theory- PG courses	Distribution of Marks
1	TESTS I (2 hours)	5
2	TESTS II / End semester Model test (3 hours)	10
3	OBE- Rubrics	10
	TOTAL MARKS	25

The following are the distribution of marks for the External Assessment in PG Theory courses

S. No.	For Theory– PG courses	Distribution of Marks	
1	Comprehensive (Written) Examination	65	50
2	Online MCQ Examination	10	--
	TOTAL MARKS	**75**	**50**

The following are the distribution of marks for External examinations (CE) and Continuous Internal Assessment (CIA) and passing minimum marks for the practical courses of PG programmes.

TOTAL MARKS	EXTERNAL		Internal Max. marks	Overall Passing Minimum for total marks (Internal + External)
	Max. marks	Passing Minimum for External alone		
100	60	30	40	50
200	120	60	80	100

The following are the distribution of marks for the Continuous Internal Assessment (CIA) in PG practical courses

S. No.	For Theory – PG Practical courses	Distribution of Marks	
1	Tests: Two tests out of which one shall be during the mid semester and the other to be conducted as model test at the end of the semester.)	24	48
2	OBE- Rubrics	16	32
	TOTAL MARKS	**40**	**80**

The following are the distribution of marks for the External Assessment in PG practical courses

S. No.	For Theory – PG Practical courses	Distribution of Marks	
1	Experiment-I	25	50
2	Experiment-II	25	50
3	Record & Viva-Voce	10	20
	TOTAL MARKS	**60**	**120**

The following are the distribution of marks for Project and Viva voce examinations/Industrial Training and Continuous Internal Assessments and passing minimum marks for the project courses/Industrial Training of PG programmes

TOTAL MARKS	EXTERNAL		Internal Max. marks	Overall Passing Minimum for total marks (Internal + External)
	Max. marks	Passing Minimum for External alone		
100	60	30	40	50
200	120	60	80	100

The following are the distribution of marks for the Continuous Internal Assessment in PG Project/ Industrial Training courses.

S. No.	For- PG Project courses/ Industrial Training	Distribution of Marks	
1	Review-I	10	20
2	Review-II	10	20
3	Review-III	10	20
4	Documentation	10	20
	TOTAL MARKS	**40**	**80**

The following are the distribution of marks for the External Examination (CE) in PG Project /Industrial Training courses

S. No.	For- PG Project courses/ Industrial Training Courses	Distribution of Marks	
1	Record Work and Presentation	40	80
2	Viva-Voce	20	40
	TOTAL MARKS	**60**	**120**

- The end semester examinations shall normally be conducted after completing 90 working days for each semester.

- The maximum marks for each theory and practical course (including the project work and Viva-Voce examination in the final Semester) shall be 100 with the following breakup.

(i) **Theory Courses**

Continuous Internal Assessment (CIA) : 25 Marks

End Semester Exams (ESE) : 75 Marks

(Online Exam: 10 Marks &Written Exam: 65 Marks)

(ii) **For Practical Courses**

Continuous Internal Assessment (CIA) : 40 Marks

End Semester Exams (ESE) : 60 Marks

Continuous Assessment OBE Rubrics Score Sheet

Degree: _____ Branch: _____ Semester: _____

Course Code: _____ Course: _____

Max. Marks: Internal:_____ External: _____ Total: _____

S. No.	REG. NO.	THEORY / PRACTICAL & LIBRARY CLASS PARTICIPATION (15) (Compulsory)				RUBRICS ASSESSMENT (SELECT ANY ONE)									Total Marks out of : 30	Total Marks out of : 16 / 10 / 08 / 04
						PAPERS / REPORTS (15)			ASSIGNMENTS (15)			CLASS PRESENTATION (15)				
		Library	Integration of Knowledge	Interaction & Participation	Demonstration of Knowledge	Organization & Knowledge	Format & Spelling	Reference / Experiments	Demonstration of Knowledge	Format & Spelling	Reference	Content & Coherence	Creativity and Speaking Skills	Duration of Presentation		
		6	3	3	3	5	5	5	5	5	5	5	5	5		
1																

a) Utilization of Library

Marks will be awarded to the student based on the hours spent in the library after the working hours and submission of report by the student.

Hours spent in Library	Marks	Type of Document submitted
2	1	Report/ Assignment/ Class presentation
4	2	
6	3	
8	4	
10	5	
12	6	

- During the Library hour, the student must spend time in reading the articles, books, journals of their subject of interest
- Each student should borrow minimum three books during the semester

b) Class Participation

Active participation in classroom discussion by the student will be evaluated based on Integration of knowledge, Interaction and Participation and demonstration of knowledge.

c) Papers / Reports/ Assignments/ Class Presentation

The student will be evaluated based on his ability to do analysis of application of theory to real world problems or creative extension of class room learning and his/her ability to communicate the given topic effectively and clearly. The following are the distribution of marks for the continuous internal assessment in PG practical courses

4. FOR PROGRAMME COMPLETION

Programme Completion (for students admitted during the A.Y.2019-20 and Onwards)

Student has to complete the following:

i) Core, EDC, DSE, Project as mentioned in the scheme

ii) Internship / Industrial/ Institutional training as mentioned in the scheme

Students must undertake industrial / institutional training for a minimum of 15 days and not exceeding 30 days during the II semester summer vacation. The students will submit the report for evaluation during III semester.

Based on the performance Grade will be awarded as follows:

Marks Scored	Grade to be awarded
75 and above	A
60-74	B
50-59	C
< 50	Re-Appearance

Course Code	Course Name	Category	L	T	P	Credit
194CS2A1CA	RELATIONAL DATABASE MANAGEMENT SYSTEM	CORE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The concepts, techniques, and applications of the database management technology
- The techniques of Database Design and Querying
- The hands-on experience to use an existing Database Management System to develop a database application system

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To learn about structure of relational databases	K2
CO2	To know about the structured query language	K3
CO3	To know about ER model	K2
CO4	To learn about querying and transactions	K3
CO5	To learn about Oracle No SQL database	K2

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	M	M	M	S	S
CO2	M	S	S	S	M
CO3	S	S	M	M	S
CO4	M	M	M	S	M
CO5	M	M	M	M	M

S Strong M Medium L Low

194CS2A1CA	RELATIONAL DATABASE MANAGEMENT SYSTEM	SEMESTER I

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Relational Databases 10 h

Introduction to the Relational Model - Structure of Relational Databases - Database Schema - Keys - Schema Diagrams - Relational Query Languages - Relational Operations -Introduction to SQL- Overview of the SQL Query Language-SQL Data Definition- Basic Structure of SQL Queries- Additional Basic Operations- Set Operations - Null Values - Aggregate Functions - Nested Sub queries - Modification of the Database.

Unit II Intermediate and Advanced SQL 9 h

Join Expressions -Views - Transactions - Integrity Constraints - SQL Data Types and Schemas - Authorization -Accessing SQL from a Programming Language - Functions and Procedures - Triggers - Recursive Queries- Advanced Aggregation Features-OLAP.

Unit III Database Design 10 h

Database Design and the E-R Model-Overview of the Design Process- The Entity-Relationship Model - Constraints - Removing Redundant Attributes in Entity Sets - Entity-Relationship Diagrams - Reduction to Relational Schemas - Entity-Relationship Design Issues - Extended E-R Features-Relational Database Design Features of Good Relational Designs - Atomic Domains and First Normal Form - Decomposition using Functional Dependencies.

Unit IV Query Processing and Transaction Management 9 h

Query Processing - Overview - Measures of Query Cost - Selection Operation - Sorting - Join Operation - Other Operations - Evaluation of Expressions Transactions-Transaction Concept-A Simple Transaction Model - Storage Structure - Transaction Atomicity and Durability - Transaction Isolation - Serializability Transaction Isolation and Atomicity - Transaction Isolation Levels - Implementation of Isolation Levels -Transactions as SQL Statements.

Unit V Oracle NoSQL Database 10 h

Introduction to NoSQL Systems-Big Data and NoSQL, Types of Big Data Processing-NoSQL vs Relational Database –Types of NoSQL databases-Oracle No

SQL High Level Architecture-Intelligent Client Driver-Storage and Network Topology-Hashing, Partitions and Data Distribution-Storing Records-Log Structured Storage-Writing, Reading ,Updating and Deleting Records.

Text Books

1 Abraham Silberchatz, Henry F.Korth, Sudharshan. S, 2011 "Database System Concepts", Sixth Edition, McGraw Hill.

2 Ashok Joshi, Chaitanya Kadaru, Aalok Muley, Maqsood Alam, 2013 "Oracle NoSQL Database: Real-Time Big Data Management for the Enterprise", McGraw Hill Osborne Media, Oracle Press..

References

1 Date C.J, Kannan.A, Swamynathan. S ,2009, "An Introduction to Database Systems ",8th Edition, Pearson Education.

2 RamezElmasri, Shamkant B.Navathe, 2009, "Fundamentals of Database Systems ",5th Edition, Pearson Education.

Course Code	Course Name	Category	L	T	P	Credit
194CS2A1CB	ADVANCED JAVA PROGRAMMING	CORE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- Graphical User Interface (GUI), multithreading.
- Networking and Database manipulation.
- Servlets and Remote Method Invocation.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the Basic OOPS and history of the Java Programming.	K2
CO2	Demonstrate Event Handling programming techniques.	K3
CO3	Demonstrate and develop Database connectivity skills.	K3
CO4	Implement the Servlet and JSP concepts in applications and develop small project.	K4
CO5	Analyze effective technique followed to develop EJB application.	K4

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	M	S	M
CO2	M	S	S	M	M
CO3	S	S	S	M	S
CO4	M	M	M	S	M
CO5	M	S	S	M	M

S Strong M Medium L Low

194CS2A1CB	ADVANCED JAVA PROGRAMMING	SEMESTER I

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Java Fundamentals 9 h

Java Fundamentals-Data types -Operators -Control Statements-Classes and Objects.

Unit II Classes and Interfaces 9 h

Methods and Classes -Inheritance -Packages -Interfaces -Exceptional Handling.

Unit III Files and Event Handling 10 h

Collections-File and Streams -Networking -Event Handling -AWT: Windows, Controls, Layout Managers and Menus -Swing -JDBC.

Unit IV Servlets and JSP 10 h

Java Servlets: Design -Life Cycle-Cookies -Session tracking-Java Server Pages: Overview -Implicit Objects -Scripting -Standard Actions-Directives.

Unit V Remote Method Invocation 10 h

Remote Method Invocation: Remote Interface -Naming Class -RMI Security Manager Class -RMI Exceptions -Creating RMI Client and Server Classes.

Text Books

1 Herbert Schildt, 2011, "The Complete Reference - JAVA 2", 8th Edition, [Chapters: 1-10, 17, 19, 20, 22-24, 29, 31]..

2 Deitel & Deitel ,2008 , "Java How to Program" ,Pearson Education ,7th Edition. [Chapters: 18,20,24,25]..

References

1 Muthu, 2004, "Programming with Java", Vijay Nicole Imprints Private Ltd.

2 Cay.S. Horstmann, Gary Cornel, 2004, "Core Java 2 - Vol. II- Advanced Features", Pearson Education..

Course Code	Course Name	Category	L	T	P	Credit
194CS2A1CC	CLOUD COMPUTING	CORE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- Cloud Computing Techniques and Concepts
- To Implement various Cloud Computing concepts
- Cloud Infrastructure and Security

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understanding the Cloud Computing.	K2
CO2	To learn about Data Storage in the Cloud	K2
CO3	To know about General Security Advantages of Cloud-Based Solutions	K3
CO4	To know about managing the Cloud	K3
CO5	To learn about designing Cloud Based Solutions	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	S
CO2	M	M	M	S	M
CO3	S	M	M	M	S
CO4	S	S	S	S	M
CO5	M	M	M	M	S

S Strong M Medium L Low

194CS2A1CC	CLOUD COMPUTING	SEMESTER I

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Introduction to Cloud 10 h

First Drive: Introduction Cloud Computing – Essentials - Benefits - Why Cloud? - Business and IT Perspective - Cloud and Virtualization - Cloud Service Requirements - Cloud and Dynamic Infrastructure - Cloud Computing Characteristics - Cloud Adoption - Cloud Rudiments. Introduction - Cloud Characteristics: On-Demand Service - Ubiquitous Network Access – Location-Independent Resource Pooling (Multi-Tenant) - Rapid Elasticity-Measured service.

Unit II Cloud Deployment 9 h

Cloud Deployment Models :Public Clouds – Private Clouds – Hybrid Clouds – Community Clouds – Shared private Clouds – Dedicated Private Clouds – Dynamic Private Clouds – Cloud Models Impact – Savings and Cost Metrics – commoditization in Cloud Computing - Security in a Public Cloud – Public Versus Private Clouds - Cloud Infrastructure Self-Service – Cloud as a Service: Introduction - Gamut of Cloud Solutions :Platform-as-a-Service – Software-as-a-Service – Infrastructure-as-a-Service.

Unit III Cloud Solutions 10 h

Cloud Solutions: Introduction - Cloud Application Planning – Cloud Business and Operational Support Service (BSS and OSS) – Cloud Ecosystem – Cloud Business Process Management – Cloud service Management – On-Premise Cloud Orchestration and Provisioning Engine – Computing on Demand (CoD) – Cloudsourcing. Cloud Management: Introduction: Service-Based Model – Resiliency – Provisioning – Asset Management – Cloud Governance – High Availability and Disaster Recovery – Charging Models, Usage Reporting, Billing, and Metering.

Unit IV Cloud Offerings and Information Security 9 h

Cloud Offerings : Introduction - Information Storage, Retrievals, Archive, and Protection – Cloud Analytics :Cloud Business Analytics Competencies – How It Works: Analytics – Testing Under Cloud :Benefits – Value Proposition – The Biggest Benefiters – Cloud Offering Key Themes – Information Security :Expectation of Privacy – Security Challenges – Security compliance – Identity-

Based Protection – Data Protection at Cloud – Application Security at Cloud Deployment – Virtual Desktop Infrastructure – Storage Cloud.

Unit V Cloud Virtualization 10 h

Cloud Virtualization Technology: Introduction - Virtualization Definition – Virtualization Benefits – Server Virtualization – Virtualization for x86 Architecture – Hypervisor Management Software – Virtual Infrastructure Requirements. Cloud Infrastructure Deep Dive: Introduction -Storage Virtualization – Storage Area Networks – Network-Attached Storage - Cloud Server Virtualization – Networking Essential to Cloud

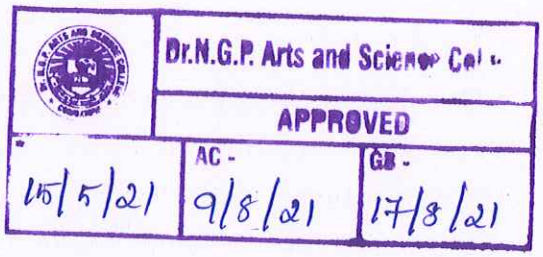
Text Books

1 Dr.Kumar Saurabh, 2014,"Cloud Computing" 2nd Edition.Wiley Publication.

References

1 Kris Jamsa, 2014, "Cloud Computing" Janes &Bartlett Learning, Wiley Publication..

2 Anthony T.Velte, Toby J.Velte, Robert Elesepeter, 2013, "Cloud Computing - A Practical Approach", McGraw Hill Education..



Course Code	Course Name	Category	L	T	P	Credit
194CS2A1CD	INTERNET OF THINGS	CORE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- IoT concepts, IoT technologies, Creative thinking techniques, Co-creation techniques.
- The possibilities offered by the different IoT technologies
- innovative applications of combinations of various technologies in real-life scenarios

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	know about Internet of Things	K2
CO2	learn about Domain Specific IoTs	K2
CO3	know about IoT Platforms Design Methodology	K3
CO4	learn about IoT Physical Devices and Endpoints	K3
CO5	learn about case study for IoT design	K2

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	M	S	M
CO2	S	S	S	S	S
CO3	S	M	S	M	S
CO4	M	M	M	S	M
CO5	M	S	S	M	M

S Strong M Medium L Low

194CS2A1CD	INTERNET OF THINGS	SEMESTER I

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Introduction to IoT 9 h

Introduction to Internet of Things: Introduction-Physical Design of IoT-Logical Design of IoT -IoT Enabled Technologies-IoT Levels and Deployment Templates. IoT and M2M: Introduction-M2M-Difference between IoT and M2M-SDN and NFV for IoT.

Unit II Domain Specific IoTs 9 h

Domain Specific IoTs: Introduction-Home Automation-Citites-EnvironmentEnergy-Retail-Logistics-Agriculture-Industry-Health and Lifestyle. IoT System Management: Need for IoT System Management-SNMP-Network Operator Requirements.

Unit III IoT Platforms 10 h

IoT Platforms Design Methodology: Introduction-IoT Design Methodology-Case Study on IoT System for Weather Monitoring –Motivation for Using Python. IoT Systems-Logical Design using Python: Introduction- Installing Python-Python Data Types and Data Structures-Control Flow-Functions-Modules-Packages-File Handling-Date/Time Operations-Classes-Python Packages of Interest for IoT.

Unit IV IoT Physical Devices and Endpoints 10 h

IoT Physical Devices and Endpoints: IoT Device-Exemplary Device: Raspberry Pi-About the Board-Linux on Raspberry Pi-Raspberry Pi Interfaces-Programming Raspberry Pi with Python-Other IoT Devices. IoT Physical Servers and Cloud Offerings: Introduction to Cloud Storage Models and Communication APIs-WAMP-Autobahn for IoT - Xively Cloud for IoT-Python Web Application Framework-Django-Designing a RESTful Web API-Amazon Web Services for IoT-SkyNetIoT Messaging Platform.

Unit V Case Study & Data Analytics for IoT 10 h

Case Studies Illustrating IoT Design: Introduction-Home Automation-Cities-Environment-Agriculture-Productivity Applications. Data Analytics for IoT: Introduction-Apache Hadoop-Using Hadoop Map Reduce for Batch Data Analysis-Apache Oozie-Apache Spark-Apache Strom-Using Apache Storm for Real-Time Data Analysis.

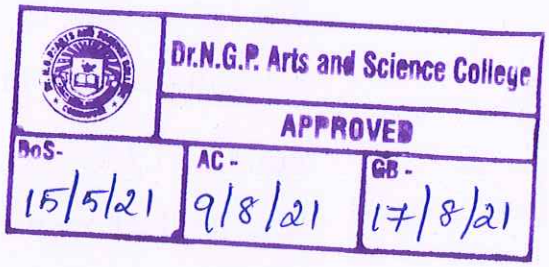
Text Books

1 Arshdeep Bahga, Vijay Madisetti, 2015, "Internet of Things-A Hands-on Approach", University Press.

References

1 Ian G. Smith, 2012 "The Internet of Things 2012 New Horizons", IREC-Internet of Things European Research Cluster.

2 Adrian McEwen, Hakim Cassimally, (2013)," Designing the Internet of Things", Wiley Publication..



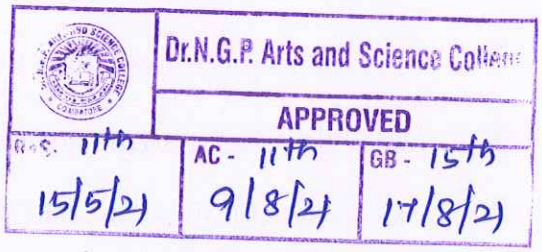
204CS2A1CP	RELATIONAL DATABASE MANAGEMENT SYSTEM	SEMESTER I

Total Credits: 2
Total Instructions Hours: 60h

S.No	List of Experiments
1	Create a table for ticket reservation details with necessary fields. Insert the data values and modify the table using INSERT, ALTER, MODIFY DROP keywords.
2	Design a table for employee details with employee number as primary key, Emp_Name, Address, designation, department, Age, Gender, DOJ, Net Salary and Gross Salary. Insert the values, group the employees using department and sort them.
3	Build a PL/SQL program for student table with Register No as primary key, student name, subject marks and average. Update the table by adding distinction field.
4	Generate a table for railway reservation with necessary fields. Insert the data values and use DCL and TCL commands like GRAND, REVOKE, COMMIT, ROLL BACK and SAVE POINT commands.
5	Construct a table for library management system with two tables master and transaction tables and create a report based on the date of return column.
6	Build a table for book store and write a PL/SQL to update the rate field with 25% increment and display the result.
7	Modify the above student table with result field and write a PL/SQL to split the table into two based on the result field.
8	Formulate a table for electricity bill calculation using cursor programming

9	Demonstrate a PL/SQL program to trigger Ticket reservation table to display the ticket booked to CHENNAI
10	Construct a program to generate a report for employee details table.
11	Display each employee's name followed by a message based on salary. If the salary is greater than Rs.1,00,000, display "High Salary'. If it is between Rs.50,000 and 1,00,000 display "Medium Salary and if the salary is below Rs.50,000 display "Low Salary.
12	Build a view that will display department names and the sum of all employee income by department.

Note: Any 10 experiments are mandatory

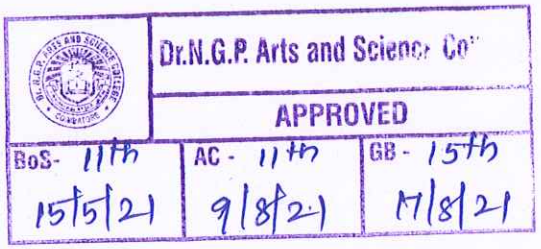


204CS2A1CQ	ADVANCED JAVA PROGRAMMING	SEMESTER I

Total Credits: 2
Total Instructions Hours: 60h

S.No	List of Experiments
1	Write a Java code to implement the types of Inheritance.
2	Illustrate the implementation of Packages in Java.
3	Design a Java code to implement Multi threading Concept.
4	Create a Java code to handle Exceptions.
5	Manipulate file operations in Java using I/O Streams.
6	Demonstrate AWT Components.
7	Perform Event handling using Swing in Java.
8	Develop Network Programming in Java.
9	Connect database using JDBC in Java.
10	Build Servlets / JSP in Java.
11	Demonstrate Remote Method Invocation in Java.
12	Implementation of Client /Server Socket Connection.

Note: Any 10 experiments are mandatory



Course Code	Course Name	Category	L	T	P	Credit
194CS2A1DA	ADVANCED COMPUTER ARCHITECTURE	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The major components of Advanced Computer Architecture.
- Parallel processing, solving problems in parallel and SIMD processors, SIMD arrays.
- Implementation of Parallel Processing and Pipelining concepts for real time problems.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To learn about Parallel Processing.	K2
CO2	To learn about Solving Problems in Parallel.	K2
CO3	To know about Principles Linear Pipelining, design and Characteristic.	K3
CO4	To demonstrate SIMD Array Processors.	K4
CO5	To design Parallel Algorithms.	K5

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	M	S	S
CO2	M	M	M	M	M
CO3	M	S	S	S	S
CO4	S	M	M	S	S
CO5	M	M	M	M	S

S Strong M Medium L Low

194CS2A1DA	ADVANCED COMPUTER ARCHITECTURE	SEMESTER I

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Introduction to Parallel Processing 10 h

Introduction to Parallel Processing - Trends towards Parallel Processing - Parallelism in Uniprocessor Systems - Parallel Computer structures - Architectural Classification schemes - Flynn' Classification - Feng's Classification - Handler's Classification - Parallel Processing Applications.

Unit II Solving Problems in Parallel Processing 9 h

Solving Problems in Parallel: Utilizing Temporal Parallelism - Utilizing Data Parallelism - Comparison of Temporal and Data Parallel Processing - Data Parallel Processing with specialized Processor - Inter-task Dependency. Instructional Level Parallel Processing - Pipelining of Processing Elements - Delays in Pipeline Execution - Difficulties in Pipelining.

Unit III Pipelining 9 h

Principles Linear Pipelining - Classification of Pipeline Processors - General Pipeline and Reservation tables - Arithmetic Pipeline - Design Examples - Data Buffering and Busing structure - Internal forwarding and Register Tagging - Hazard Detection and Resolution - Job sequencing and Collision prevention - Vector processing requirements - Characteristics - Pipelined Vector Processing methods.

Unit IV SIMD 10 h

SIMD Array Processors - Organization - Masking and Data routing - Inter PE communications - SIMD Interconnection Networks - Static Vs Dynamic - Mesh connected Iliac - Cube interconnection network - Shuffle-Exchange and Omega networks - Multiprocessor Architecture and programming Functional structures - interconnection Networks.

Unit V Parallel Algorithms 10 h

Parallel Algorithms: Models of computation - Analysis of Parallel Algorithms Prefix Computation - Sorting - Searching - Matrix Operations.

Text Books

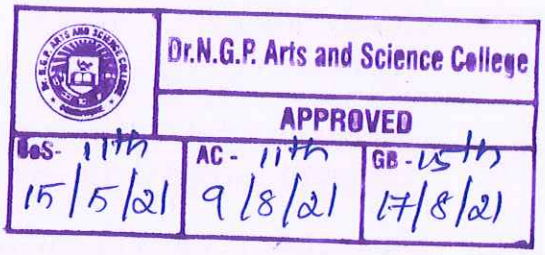
1 Kai Hwang, Faye A. Briggs, "Computer Architecture and Parallel Processing", MGH, [Unit I, III, IV].

2 Rajaraman.V, Siva Ram Murthy.C, 2004, "Parallel Computers Architectures and Programming, 3rd Edition, PHI, [Unit II, V]..

References

1 Kai Hwang, 2011, "Advanced Computer Architecture – Parallelism, Scalability, Programmability", Tata McGraw Hill..

2 Michael J. Quinn, 2009, "Parallel Computing Theory and Practice", 2nd Edition, Tata McGraw Hill..



Course Code	Course Name	Category	L	T	P	Credit
194CS2A1DB	OBJECT ORIENTED ANALYSIS AND DESIGN	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- acquire knowledge on trends and principles of Object Oriented Methodologies.
- gain problem solving skills using object based models.
- application of Unified Modeling Language

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	learn about Object Oriented System Development and basics	K2
CO2	learn about Object Oriented System Development Methodology, Booch Methodology, Jacobson Methodologies, Patterns and Unified approach.	K2
CO3	know about Unified Modeling Language, UML Class Diagram and UML Dynamic Modeling.	K3
CO4	demonstrate OO Design axioms, Designing Methods and Protocols.	K4
CO5	design Quality Assurance testing	K5

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	S
CO2	M	M	M	M	M
CO3	S	S	S	M	S
CO4	S	M	M	S	M
CO5	M	M	M	M	S

S Strong M Medium L Low

194CS2A1DB	OBJECT ORIENTED ANALYSIS AND DESIGN	SEMESTER I

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Introduction to Object Oriented Systems 9 h

Object Oriented System Development: Introduction- Object Oriented Systems Development Methodology- Why an Object Orientation. Object Basics: Introduction – Objects – Attributes – Object Behavior and Methods – Encapsulation and Information Hiding – Class Hierarchy – Object Relationships and Associations – Polymorphism – Aggregations and Object Containment. Static and Dynamic Binding.

Unit II Object Oriented System Development 10 h

Object Oriented System Development: Analysis – Design – Prototyping. Methodologies: The Booch Methodology: The Macro Development – The Micro Development Process. The Jacobson et al Methodologies: Use cases- Object Oriented Software Engineering – Object Oriented Business Engineering. Patterns: Generative and Non generative patterns- Pattern Templates- Anti patterns-capturing patterns. Unified approach: Analysis – Design – Modeling based on Unified Modeling Language.

Unit III Unified Modeling Language 9 h

Unified Modeling Language: Introduction – Static and Dynamic Models – UML Diagrams – UML Class Diagram: Class Notation – Object Diagram – Class Interface Notation- Binary Association Notation- Association Rule – Qualifier- Multiplicity-OR Association- N-Ary Association – Aggregation and composition-Generalization – Use Case Diagram – UML Dynamic Modeling: UML Interaction Diagrams – Sequence diagrams – Collaboration diagrams – State chart diagram – Activity diagram.

Unit IV OO Design 10 h

OO Design axioms: Design axioms. Designing Classes: Introduction – Design philosophy – UML Object Constraint Language- The process – Class visibility: Private and protected protocol Layers – Public Protocol Layer- Refining attributes: Attribute types – UML Attribute Presentation. Designing Methods and Protocols: Design Issues - UML Operation presentation. Access layer: Introduction – OODBMS: OOD Vs Traditional Databases- Object Relational Systems: Mapping –

Table class Mapping – Table Multiple class Mapping-Table Inherited Classes Mapping- Keys for Instance Navigation. View layer: Introduction – Designing view layer classes.

Unit V Quality Assurance Testing 10 h

Quality Assurance testing: Quality assurance tests- Testing Strategies- Impact of Inheritance in testing – Test Cases: Guidelines for developing Quality Assurance Test cases. Test Plan: Guidelines for Developing test plans. Usability testing: Guidelines for developing Usability Testing. User Satisfaction Testing: Guidelines for developing a User Satisfaction Testing.

Text Books

1 Ali Brahmi, 2013, "Object Oriented System Development", Tata McGraw Hill International Edition .

References

1 Addison-Wesley, Grady Booch, 2010, "Object-Oriented Analysis and Design",2nd Edition, Pearson Education Asia..

2 James Rumbaugh, Micheal Blah, 2001, "Object Oriented Modeling and Design", 10th Edition, Prentice Hall of India..

Course Code	Course Name	Category	L	T	P	Credit
194CS2A1DC	MOBILE COMPUTING	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- Concept of Wireless Mobile Computing.
- GSM , GPRS architecture and its services.
- World Wide Web and its applications.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understanding the Vertical and applications of Wireless Networking.	K2
CO2	know about Space Division Multiplexing.	K2
CO3	learn about comparison of S/T/F/CDMA.	K3
CO4	demonstrate the UMTS and IMT.	K4
CO5	design a case study on World Wide Web.	K5

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	S
CO2	M	M	M	S	M
CO3	S	S	S	M	S
CO4	S	S	S	S	M
CO5	M	M	M	M	S

S Strong M Medium L Low

194CS2A1DC	MOBILE COMPUTING	SEMESTER I

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Introduction to Wireless Networking 10 h

Introduction - Vertical and applications of Wireless Networking - Positioning of Wireless networking relative to wired networks - Wireless LAN and Wireless WAN - Wireless PBXs map - The Radio Spectrum cell size and achievable throughput. Wireless transmission - Frequencies for radio transmission - Regulations - Signals, Antennas, Signal propagation, path loss of radio signals, Additional signal propagation effects- Multi-path propagation - Multiplexing.

Unit II Multiplexing 9 h

Space division multiplexing - Frequency division multiplexing - Time division multiplexing - Code division multiplexing. Spread spectrum - Direct sequence spread spectrum - Frequency hopping spread spectrum - Cellular systems. Medium access control - Hidden and exposed terminals - Near and far terminals - SDMA, FDMA, TDMA, Fixed TDM, Classical Aloha, slotted Aloha, Carrier sense multiple access- Reservation TDMA - Multiple access with collision avoidance - Polling - CDMA - Spread Aloha multiple access. Comparison of S/T/F/CDMA.

Unit III GSM 10 h

GSM - Mobile services - System architecture - Radio interface - Protocols - Localization and calling -Handover - Security - Location Management for Mobile Cellular Systems - GPRS - Mobile services - System Architecture.

Unit IV MAC and Mobile Network Layer 10 h

UMTS and IMT - 2000.Wireless LAN - Infra red vs. radio transmission - Infrastructure and ad-hoc network - IEEE 802.11 - System architecture - Protocol architecture - Physical layer - Medium access control layer - MAC management - Blue tooth. Mobile network layer - Mobile IP - Goals, assumptions and requirements - Entities and terminology - Packet delivery - Agent discovery - Registration - Tunneling and encapsulation Recent technologies.

Unit V World Wide Web 9 h

World Wide Web - WAP - Architecture - wireless datagram Protocol, Wireless transport layer security, Wireless Transaction Protocol, Wireless Session Protocol, Wireless application environment, Wireless Markup Language, WML script - Mobile computing applications using J2ME.

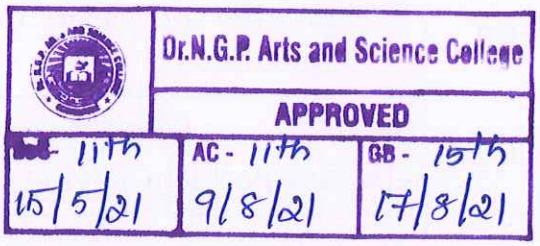
Text Books

1 John Schiller, 2003, "Mobile Communications", Addison Wesley..

References

1 Steve Mann and Scoot Schibli, "The Wireless Application Protocol", John Wiley &Sons, Inc.

2 Steve Mann, 2000,"Programming Applications With The Wire Less Application Protocol", John Wiley & Sons, Inc..



Course Code	Course Name	Category	L	T	P	Credit
194CS2A2CA	DESIGN AND ANALYSIS OF ALGORITHMS	CORE	4	0	0	4

PREAMBLE

This course has been designed for students to learn and understand

- Fundamental concepts of design and analysis of algorithms
- Important algorithmic design paradigms and methods of analysis
- Different algorithmic techniques

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Interpret the complexity of algorithms and paradigms to solve problems	K2
CO2	Show and understand Divide and Conquer technique for effective problem solving in computing	K2
CO3	Apply Greedy technique to solve problems in different approach	K3
CO4	Analyze the complexities of various problems in different domains	K4
CO5	Make use of Backtracking, Branch and Bound techniques to solve optimization problem	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	L	M
CO2	M	S	L	M	S
CO3	L	L	M	S	S
CO4	M	L	S	M	L
CO5	S	S	M	M	M

S Strong **M Medium** **L Low**

194CS2A2CA	DESIGN AND ANALYSIS OF ALGORITHMS	SEMESTER II

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Introduction 9 h

Fundamentals of Algorithmic Problem Solving – Important Problem Types – Fundamentals of the Analysis of Algorithm Efficiency – The Analysis Framework – Asymptotic Notations and Basic Efficiency Classes – Mathematical Analysis for Recursive and Nonrecursive Algorithms

Unit II Divide and Conquer Method 10 h

Divide and Conquer Methodology – Mergesort: Algorithm – Quicksort: Algorithm – Binary Tree Traversals and Related Properties: Algorithm – Multiplication ofLarge Integers – Strassen's Matrix Multiplication

Unit III Greedy Method 10 h

Greedy Technique – Prim's Algorithm: Definition - Algorithm – Kruskal's Algorithm: Definition - Algorithm - Disjoint Subsets and Union - Find Algorithms – Dijkstra's Algorithm: Definition - Algorithm – Huffman Trees and Codes:Definition - Algorithm

Unit IV Dynamic Programming 9 h

Three Basic Examples: Algorithm - Knapsack Problem and Memory Functions: Definition - Algorithm - Optimal Binary Search Trees: Definition - Algorithm - Warshall's Algorithm: Definition - Algorithm - Floyd' Algorithm for the All-Pairs Shortest-Paths Problem: Definition - Algorithm.

Unit V Backtracking and Branch and Bound 10 h

Backtracking – N-Queens Problem – Hamiltonian Circuit Problem – Subset-Sum Problem – Branch and Bound – Assignment Problem – Knapsack Problem – Traveling Salesman Problem.

Text Books

1 Anany Levitin, 2017, "Introduction to the Design and Analysis of Algorithms", 3rd Edition, Pearson, New Delhi..

References

1 Sridhar, S. 2014, "Design and Analysis of Algorithms", 1st Edition, Oxford University Press, Noida..

2 Tanenbaum, A.M. 2008, "Data Structures Using C", 2nd Edition, Prentice Hall of India, New Delhi..

3 Ellis Horowitz, SartajSahni and Sanguthevar Rajasekaran. 2008, "Fundamentals of Computer Algorithms",2nd Edition, Universities Press Private Limited, New Delhi..

4 Ellis Horowitz and Sartaj Sahni. 2003, "Fundamentals of Data Structures ", 2nd Edition, Galgotia Publication, Gurgaon..

Course Code	Course Name	Category	L	T	P	Credit
194CS2A2CB	INTERNET PROGRAMMING	CORE	4	0	0	4

PREAMBLE

This course has been designed for students to learn and understand

- Basics of HTML, XML and CSS and their implementation
- Concepts of JavaScript, AJAX and AngularJS
- The Design and Deployment of Web Services

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand about HTML5 and CSS	K2
CO2	Interpret XML and Java Script	K2
CO3	Utilize the Web Servers	K3
CO4	Summarize about Angular JS Concepts	K2
CO5	Use of AJAX and Web Services	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	L	S
CO2	M	L	S	M	L
CO3	S	M	M	L	S
CO4	S	M	L	S	M
CO5	S	M	L	S	M

S Strong M Medium L Low

194CS2A2CB	INTERNET PROGRAMMING	SEMESTER II

Total Credits: 4
Total Instruction Hours: 48 h

Syllabus

Unit I Introduction to Markup Language 9 h

Introduction HTML5: Editing HTML5 documents - First HTML5 - W3C HTML5 Validation Service - Headings - Images - List - Tables - Forms - Cascading Style Sheets: Inline styles - Embedded style sheets - Conflicting styles - Linking Externalstyle sheets - Backgrounds - Box model and Text Flow - Dropdown menus

Unit II Basics of XML and JavaScript 10 h

XML Basics - Structuring data - XML namespaces - Document Type Definition- W3C XML Schema Documents - XML Vocabularies - Java Script: Your First Scriptand Modifying first script - Obtaining user inputs with prompt dialogs - Controlstatements: if, if..else, while, for repetition statements-switch multiple selectionstatements-do..while repetition statements - break and continue statements -Function Definition: Random number Generation -Recursion - Recursion VsIteration

Unit III Java Script and Web Servers 10 h

Arrays - Declaring and allocating Arrays - Random Image Generator Using Arrays - Objects: math, string, date, boolean and number objects - Events: Reviewing the load Event - Event mouse move and event object - Rollovers with mouseover and mouseout - Web servers: HTTP Transactions - Multitier Application Architecture Client Side Scripting Vs Server Side Scripting - Accessing Web Servers

Unit IV Angular JS 9 h

Basics of AngularJS – Data Binding and your first AngularJS Web application – Modules – Scopes – Controllers – Expressions – Filters – Introduction to Directives– Built in Directives: Basic ng Attribute Directives- Directives with Child Scope - Angular Module Loading: Configuration - Run Blocks -Services– Events.

Unit V Ajax and Web services 10 h

Ajax: Rich Internet Applications (RIA's) with Ajax – History of Ajax– Raw Ajax Example using the XML HttpRequest Object – Creating a full scaled Ajax Enabled Application - Web Services: Building Blocks – Basics of Simple Object Access Protocol (SOAP), Web Services Description Language (WSDL) and Universal Description, Discovery, and Integration (UDDI)

Text Books

1. Paul J. Deitel, Harvey M. Deitel, Abbey Deitel, 2018., " Internet & World Wide Web How to Program", 5th Edition, Deitel series. Unit I to Unit III, Unit V.
2. Ari Lerner,. 2013, "ng-book The Complete Book on AngularJS", Fullstack.io. 5th Edition., Unit IV.

References

1. Ron Schmelzer, Travis Vandersypen, Jason Bloomberg, Madhu Siddalingaiah, Sam hunting, Micheal D.Qualls, David Houlding, ChadDarby, Diane Kennedy,. 2012,"XML and Web Services", 2nd Edition., Pearson, Noida..
2. Bruce Lawson, Remy Sharp, 2012, "Introducing HTML5", 2nd Edition, New Riders, New Delhi.
3. Mathew Eernisse, 2006,"Build Your Own AJAX Web Applications", 1st Edition, SitePoint, New Delhi..
4. Eric Newcomer, 2002, "Understanding Web Services: XML, WSDL, SOAP, and UDDI",1st Edition, Addison-Wesley, New Delhi..

Course Code	Course Name	Category	L	T	P	Credit
194CS2A2CC	NETWORK SECURITY	CORE	4	0	0	4

PREAMBLE

This course has been designed for students to learn and understand

- Fundamentals of security
- Theory behind the security of different cryptographic algorithms
- Knowledge on authentication mechanisms and firewalls

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Show and understand the basic concepts of security	K1
CO2	Explain the different Symmetric Key Cryptographic Algorithms	K2
CO3	Interpret the various key distribution, algorithms and management schemes	K2
CO4	Apply the basic concepts of Internet Security Protocols	K3
CO5	Understand Authentication, Firewall and Virtual Private Network	K1

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	L	M	L
CO2	S	M	L	S	M
CO3	L	M	L	S	M
CO4	L	L	M	L	M
CO5	L	M	L	S	M

S Strong M Medium L Low

194CS2A2CC	NETWORK SECURITY	SEMESTER II

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Introduction to Concepts of Security 9 h

Introduction - Need for security - Security approaches - Principles of Security - Types of Attacks. Cryptography Techniques: Plain Text and Cipher Text - Encryption and Decryption - Symmetric and Asymmetric key Cryptography: Symmetric Key Cryptography and the problem of Key Distribution - Diffie-Hellman Key Exchange / Agreement Algorithm - Asymmetric Key Operation. Steganography

Unit II Computer-Based Symmetric Key Cryptographic Algorithms 10 h

An Overview of Symmetric Key Cryptography - Data Encryption Standard (DES): Background and History – Working of DES - Variations of DES. RC5: Background and History – Working of RC5 – RC5 Modes – Blowfish: Operation. Advanced Encryption Standard (AES): Operation - One-Time Initialization Process – Process in each round

Unit III Computer-Based Asymmetric Key Cryptographic Algorithms 10 h

An Overview of Asymmetric Key Cryptography - The RSA Algorithm: Introduction – Examples of RSA – Understanding the Crux of RSA. Digital Signatures: Introduction – Message Digests (MD) – MD5 – Secure Hash Algorithm (SHA) – Message Authentication Code (MAC) – Digital Signature Techniques - Attacks on Digital Signatures

Unit IV Internet Security Protocols 9 h

Basic Concepts: Static Web Pages – Dynamic Web Pages – Active Web Pages – Protocols and TCP/IP – Layered Organization. Secure Socket Layer (SSL): The position of SSL in TCP/IP Protocol Suite – Working of SSL – Buffer Overflow attacks on SSL. Secure Hypertext Transfer Protocol (SHTTP). Email Security: Privacy Enhanced Mail (PEM) – Secure Multipurpose Internet Mail Extensions (S/MIME). Security in GSM - Security in 3G

Unit V User Authentication Mechanisms, Firewalls and Virtual Private Network (VPN) 10 h

User Authentication: Authentication Basics. Passwords: Clear Text Passwords –

Something Derived from Passwords. Authentication Tokens: Authentication Token Types. Biometric Authentications: Working of Biometrics. Firewalls: Types of Firewalls – Firewall Configurations. IP Security: IPSec Overview – Authentication Header (AH). Virtual Private Network (VPN): VPN Architecture

Text Books

1 AtulKahate, 2019, "Cryptography and Network Security", 4th Edition, Tata McGraw-Hill Education Pvt. Ltd. New Delhi.

2 Behrouz Forouzan, 2015,"Cryptography and Network Security" , 3rd Edition, Tata McGraw-Hill Education Pvt. Ltd, New Delhi.

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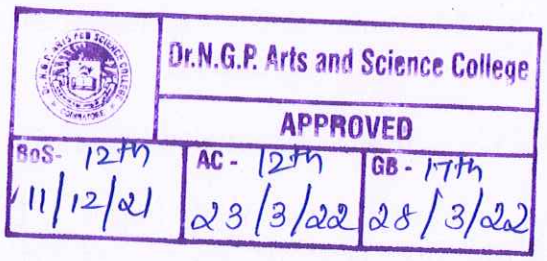
1 William Stallings, 2017, "Cryptography and Network Security Principles of Practices" 7th Edition, Pearson Education Limited, Noida. .

2 Prakash Gupta. C, 2015, "Cryptography and Network Security", 1st Edition, PHI Learning Private Limited, New Delhi.

3 Jonathan Katz, Yehuda Lindell, 2014, "Introduction to Modern Cryptography", 2nd Edition, Chapman & Hall, New Delhi.

4 Christof Paar, Jan Pelzl, 2010, "Understanding Cryptography", 1st EditionSpringer, New Delhi



204CS2A2CP	CORE PRACTICAL: DESIGN AND ANALYSIS OF ALGORITHMS	SEMESTER II

Total Credits: 2
Total Instructions Hours: 60 h

S.No	List of Experiments
1	Factorial of numbers and Towers of Hanoi using Recursion.
2	Implement Matrix multiplication using Non recursive approach.
3	Divide and Conquer technique to arrange a set of numbers using Merge sort.
4	Divide and Conquer technique to arrange a set of numbers using Quick sort.
5	Implement Binary Tree Traversals.
6	Implement Kruskal's algorithm using Greedy technique.
7	Implement Huffman Trees and Codes using Greedy approach.
8	Construct Optimal Binary Search trees using Dynamic Programming.
9	Implement Knapsack problem using Dynamic Programming.
10	Implement Floyd' Algorithm for the All-Pairs Shortest-Paths Problem using Dynamic Programming.
11	Implement 8-Queens Problem using Backtracking.
12	Find the solution of Travelling Salesperson problem using Branch and Bound Technique.

Note: Any 10 experiments are mandatory

204CS2A2CQ	CORE PRACTICAL: INTERNET PROGRAMMING	SEMESTER II

Total Credits: 2
Total Instructions Hours: 60 h

S.No	List of Experiments
1	Create a web page for a departmental store using tables and forms in HTML5
2	Create an e-commerce web page to sell books online using CSS (Inline, External and Embedded).
3	Create an XML document that contains 10 users Information. Write a program, which includes user Id as an input and retrieve the user details from the XML document
4	Create a web page that displays the number of days in the current month and year using Java Script functions
5	Create a web page to perform various Java Script Events
6	Write a Java script program to upload a file and deploy it in web server
7	Write an AngularJS code for validating user registration form
8	Create a form using AngularJS which collects the student information
9	Write an Angular JS code to perform the various Mouse events.
10	Write an AngularJS code for an order form that sorts data using filters.
11	Create an AJAX enabled application to display the details of customers in a bank.
12	Create a web page that displays date and time using web services

Note: Any 10 experiments are mandatory

Dr.N.G.P. Arts and Science College
APPROVED

BoS- 7th	AC - 12th	GB - 17th
11/12/21	23/3/22	28/3/22

Course Code	Course Name	Category	L	T	P	Credit
194IT2A2EA	DIGITAL MARKETING	EDC	4	0	0	4

PREAMBLE

This course has been designed for students to learn and understand

- Different styles of marketing
- Concept of marketing through social media
- Marketing strategies in real time environment

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Show the digital marketing strategies	K1
CO2	Demonstrate and understand the nuances of advertising	K2
CO3	Apply the marketing strategies in social media	K3
CO4	Interpret the Web Analytics and Mobile Analytics	K4
CO5	Analyze the marketing strategies with case studies	K2

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	L	M	L
CO2	S	M	L	S	M
CO3	L	M	L	L	M
CO4	M	L	M	S	S
CO5	S	M	L	S	L

S Strong M Medium L Low

194IT2A2EA	DIGITAL MARKETING	SEMESTER II

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Introduction to Digital Marketing 10 h

Digital Marketing- internet users- Digital Marketing strategy- Digital Advertising Market in India- Skills required in Digital Marketing- Digital Marketing Plan, Display Advertising- concept- types of display Advertisement- models- Plan- Targeting- Good Ad- programmatic Digital Advertising- Analytic tools- YouTube Advertising

Unit II Search Engine Advertising 9 h

Search Engine and Advertising– Analytics – Competition - Understanding Ad Placement- Ad Ranks – Basic Ad Auction Model – Important of AdRank–Search Advertising Account - Architecture – Creating Effective Ads - Ad Campaign - Enhancing AdCampaign – Advanced Ad format – Account Monitoring - performance report – Segments – Search Terms – Auction Insights

Unit III Social Media Marketing 9 h

Introduction –Social Media Strategy and Implementation - Face book Marketing – Facebook for business – Adverts – Facebook Insight – Design Tools - LinkedIn Marketing - LinkedIn Groups – LinkedIn Analytics - Twitter Marketing- Twitter in India –Twitter Ads – Twitter Analytics – Twitter Management and Monitoring Tools - Instagram and Snapchat Apps - Mobile Marketing

Unit IV Search Engine Optimization 10 h

Introduction- Search Engine – concepts- On page and off page Phases- optimizations- Social Media reach- Maintenance. Web Analytics: Introduction- Data collection- Key Metrics- making web- Analytic Aeconable- multi Channel Advertising- types of Tracking codes- Mobile Analytics- Universal Analytics- Competitive Intelligence

Unit V Case Shell 10 h

Aisel Fashion Shoot- Kotak Securities- The Fall and Rise of Maggi- TATA DOCOMO- ICICI Bank- Merchenders- Benz- DELL- Barclays Business Banking SEO campaign- conversion Tracking through URL builder- A Hotel branch- UAV coach- Philips AirFryor- KanKhajura Station and H&M

Text Books

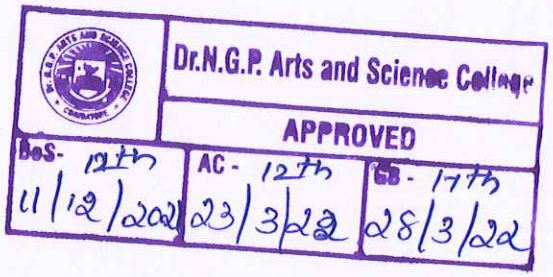
1 Seema Gupta, 2017, "Digital Marketing", 1st Edition, Wiley, New Delhi.

References

1 Puneet Singh Bhatia, 2017, "Fundamentals of Digital Marketing", 1st Edition, Pearson, Noida.

2 Philip Kotler, 2017,"Marketing 4.0: Moving from Traditional to Digital", 1st Edition, Wiley, New Delhi.

3 Dr.Ragavendra K. and Shruthi P, 2016, "Digital Marketing", 1st Edition, Himalaya Publishing House Pvt. Ltd, Mumbai.



Course Code	Course Name	Category	L	T	P	Credit
194CS2A2DA	WIRELESS NETWORKS	DSE	4	0	0	4

PREAMBLE

This course has been designed for students to learn and understand

- Evolving Wireless Technologies
- Mobility in Wireless Networks
- Various protocols, services and technologies for Wireless Networks

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the overview of Wireless Systems	K2
CO2	Demonstrate the basic skills of Cellular Communications	K2
CO3	Analyze security, efficiency, scalability and their unique characteristics in Wireless Networks	K4
CO4	Outline Wireless Application Protocol and Bluetooth	K2
CO5	Infer and understand Wireless Sensor Network and WLAN	K2

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	M	L	M
CO2	M	M	M	M	S
CO3	M	S	L	M	S
CO4	L	M	S	L	M
CO5	M	S	L	M	S

S Strong M Medium L Low

194CS2A2DA	WIRELESS NETWORKS	SEMESTER II

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Introduction to Wireless Systems 9 h

An overview of Wireless Systems - First- and Second-Generation Cellular Systems - Cellular Communications from 1G to 3G - Wireless 4G Systems- Future Wireless Networks-Case Study: 5G Technology. Teletraffic Engineering: Service Level-Traffic Usage - Traffic Measurement Units -Call Capacity-Definitions of Terms-Data Collection. An Overview of Digital Communication and Transmission: Baseband Systems - Messages, Characters, and Symbols -Sampling Process - Voice Communication

Unit II Cellular Communications and WWAN 10 h

Fundamentals of Cellular Communications: Cellular Systems - Hexagonal Cell Geometry - Cochannel Interference Ratio - Cochannel Interference Reduction - Cell Splitting - Adjacent Channel Interference (ACI). Architecture of a Wireless Wide-Area Network (WWAN): WWAN Subsystem Entities - Logical Channels - Channel and Frame Structure -Basic Signal Characteristics -Speech Processing- Power Levels in Mobile Station. Antennas, Diversity and Link Analysis: Antenna System-Antenna Gain – Performance Criteria for Antenna Systems- Diversity

Unit III Mobility Management in Wireless Networks and Security 9 h

Mobility Management in Wireless Networks: Mobility Management Functions - Mobile Location Management - Mobile Registration - Handoff. Security in Wireless Systems: Security and Privacy Needs of a Wireless System - Required Features for a Secured Wireless Communications System - Methods of Providing Privacy and Security in Wireless Systems - Wireless Security and Standards

Unit IV Wireless Application Protocol (WAP) and Bluetooth 10 h

Wireless Application Protocol: WAP and the World Wide Web (WWW) - The WAP Programming Model -WAP Architecture, Advantages and Disadvantages - Applications. Wireless Personal Area Network — Bluetooth : Bluetooth (IEEE 802.15.1) - Definitions of the Terms Used in Bluetooth - Bluetooth Protocol Stack - Bluetooth Link Types ,Security, Network Connection Establishment, Error Correction, Network Topology -Usage Models -Applications -WAP and Bluetooth

Unit V Wireless Sensor Network and WLAN 10 h

Wireless Personal Area Networks Low Rate and High Rate: Wireless Sensor Network - Usage of Wireless Sensor Networks -Wireless Sensor Network Model - Sensor Network Protocol Stack -ZigBee Technology. Wireless Local Area Networks: WLAN Equipment - WLAN Topologies -WLAN Technologies - Other WLAN Standards

Text Books

1 Vijay Garg. K, 2007,"Wireless Communication and Networking" , 1st Edition, Morgan Kaufmann Publishers, United States.

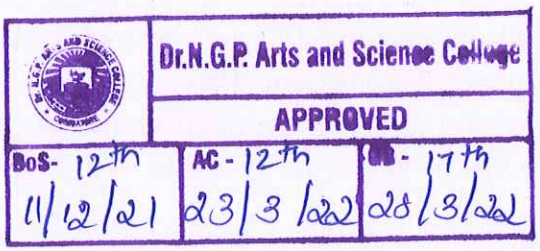
References

1 Cory Beard, William Stallings, 2016, "Wireless Communication Networks and Systems", 1st Edition, Pearson Higher Education, Noida.

2 Jane Butler, 2013, "Wireless Networking in the Developing World", 3rd Edition, CreateSpace Independent Publishing Platform, California, US.

3 Nicopolitidis P, Obadiah M S, Papadimitriou G S and Pomportsis A S, 2009, "Wireless Networks", 1st Edition, John Wiley and Sons, New York.

4 KazemSohraby, Daniel Minoli, TaiebZnati, 2007, "Wireless Sensor Networks Technology, Protocols, And Applications", 1st Edition, John Wiley & Sons, Inc. , Canada.



Course Code	Course Name	Category	L	T	P	Credit
194CS2A2DB	PRINCIPLES OF PROGRAMMING LANGUAGES	DSE	4	0	0	4

PREAMBLE

This course has been designed for students to learn and understand

- Various programming paradigms and choose appropriate languages
- High level language design and implementation
- the power of scripting language

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Tell and discuss the programming language concepts	K1
CO2	Show and learn the storage variables	K2
CO3	Outline the data abstraction concepts	K1
CO4	Spell OOP and Concurrent Programming	K1
CO5	Infer Functional and Logic Programming	K2

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	M	L	M
CO2	M	M	M	S	M
CO3	S	L	M	S	L
CO4	S	M	L	S	M
CO5	L	M	S	L	M

S Strong M Medium L Low

194CS2A2DB	PRINCIPLES OF PROGRAMMING LANGUAGES	SEMESTER II

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Programming languages 9 h

Programming languages: Programming linguistics, Concepts and paradigms Syntax, semantics, and pragmatics, Language processors - Historical development. Basic Concepts: Values and types: Types-Primitive types - Composite types - Recursive types - Type systems - Expressions

Unit II Variables and storage 10 h

Variables and storage: Variables and storage - Simple variables - Composite variables - Copy semantics Vs reference semantics - Lifetime - Pointers - Commands - Expressions with side effects. Bindings and scope: Bindings and environments-Scope-Declarations - Blocks.

Unit III Data abstraction 9 h

Data abstraction: Program units, packages, and encapsulation - Abstract types-Objects and classes - Implementation notes. Type systems: Inclusion polymorphism - Parametric polymorphism - Overloading - Type conversions - Implementation notes

Unit IV Imperative, Object-oriented and Concurrent programming 10 h

Imperative programming-: Key concepts - Pragmatics. Case study: C. Object - oriented programming: Key concepts – Pragmatics. Case study: C++. Concurrent programming: Key concepts- Pragmatics. Case study: JAVA

Unit V Functional and Logic programming 10 h

Functional Programming: Key concepts - Eager Vs normal-order Vs lazy evaluation – Pragmatics. Logic programming: Key concepts - Pragmatics - Case study: PROLOG. Scripting: Key concepts – Pragmatics - Case study: PYTHON. Conclusion: Language selection - Language design

Text Books

1 David Watt. A, 2004,"Programming Language Design Concepts" 1st Edition, John Wiley & Sons Ltd, Noida.

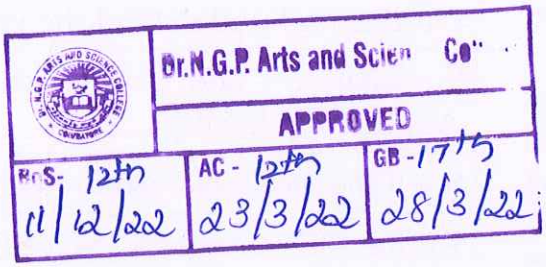
References

1 Robert Sebesta. W, 2016, "Concepts of Programming Languages", 8th Edition, Pearson Education Limited, Noida.

2 Ravi Sethi, 2009, "Programming Languages Concepts & Constructs", 2nd Edition, Pearson Education, Noida.

3 Franklyn Turbak, David Gifford, Mark A. Sheldon, 2008, "Design Concepts In Programming Language", 1st Edition, MIT Press, Canada.

4 Carlo Ghezzi, Mehdi Jazayeri, 2003,"Programming Language Concepts", 3rd Edition,John Wiley & Sons, Noida.



Course Code	Course Name	Category	L	T	P	Credit
194CS2A2DC	AUGMENTED REALITY AND VIRTUAL REALITY	DSE	4	0	0	4

PREAMBLE

This course has been designed for students to learn and understand

- Concepts of Augmented Reality & Virtual Reality
- Ideas of 3D Graphics
- Applications of Augmented Reality & Virtual Reality

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Show the basics of Augmented Reality	K1
CO2	Outline and understand the value of Augmented Reality	K2
CO3	Summarize and understand the applications of Augmented Reality	K2
CO4	Spell the basics of Virtual Reality	K1
CO5	Define 3D Graphics concept and the applications of Virtual Reality	K1

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	L	S	M
CO2	S	M	L	S	M
CO3	S	M	L	S	M
CO4	S	M	M	M	L
CO5	S	M	L	M	L

S Strong M Medium L Low

194CS2A2DC	AUGMENTED REALITY AND VIRTUAL REALITY	SEMESTER II

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Augmented Reality and its Types 10 h

Introduction: Definition of Augmented Reality (AR) – Components of Augmented Reality – History of Augmented Reality - Augmented Reality 2012 – Difference between Augmented Reality and Virtual Reality (VR) – Challenges with Augmented Reality – Opportunities for Augmented Reality. Types of Augmented Reality: Augmented Reality Works - Augmented Reality Methods – Augmented Reality Display Technology

Unit II The Value of Augmented Reality 9 h

The Next User Interface – The Uses of Augmented Reality: Sports Gaming and Entertainment – Education – Medicine – Business and Commerce – Retail and Shopping - Augmented Reality Windshields – Public Safety, The Military and The Law – AR and Law Enforcement: Drone Technology and AR – Collaborative Crime Scene Investigation – AR Flight Tracker

Unit III Organization and Applications of AR 9 h

Companies Specializing in Augmented Reality: Total Immersion – Google X – Gravity Jack – AR Toolkit – Metaio – Junaio - Layar – Augmented Reality Tools – Augmented Reality Blogs. Visions of the Future: The Big Trends – The Technical Trends – Future Concepts for Augmented Reality. Interactions in Augmented Reality Applications: Tangible User Interface – Collaborative Augmented Reality Interface

Unit IV Virtual Reality 10 h

Definition of Virtual Reality – VR Concepts and Terms – Navigation and Interaction – Immersion and Presence – Not VR – The Internet. Benefits of VR: 3D Visualization – Navigation – Interaction – Physical Simulation – VEs. VR Hardware: Computers – Tracking – Input Devices – Output Devices – Glasses – Displays – Audio. VR Software: VR Software Features – Web-Based VR – Division's dVISE – Blueberry 3D – Boston Dynamics – MultiGen

Unit V 3D Computer Graphics & VR Applications 10 h

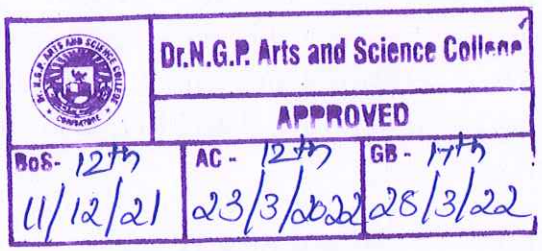
Computer Graphics to VR - Modelling Objects - Dynamic Objects - Constraints - Collision Detection - Perspective Views - 3D Clipping - Stereoscopic Vision - Rendering the image - Rendering Algorithms - Texture Mapping - Bump Mapping - Environment Mapping - Shadows - Radiosity - Other Computer Graphics

Text Books

1. Gregory Kipper, Joseph Rampolla, 2012,"Augmented Reality, An Emerging Technologies Guide to AR", 1st Edition, Elsevier, Chennai.
2. John Vince, 2004, "Introduction to Virtual Reality", 1st Edition, Springer, New Delhi.

References

1. Alan Craig. B, 2013, "Understanding Augmented Reality Concepts and Applications", 1st Edition, Elsevier, Chennai.
2. Paul Mealy, 2018"Virtual & Augmented Reality", 1st Edition, John Wiley & Sons, Inc., New Delhi
3. William R. Sherman Alan B.Craig, 2018, "Understanding Virtual Reality: Interface, Application, and Design", 2nd Edition, Elsevier, Chennai.
4. Steven. LaValle, M, 2019, "Virtual Reality", 1st Edition, Cambridge University Press, UK.



Course Code	Course Name	Category	L	T	P	Credit
194CS2A3CA	OPEN SOURCE TECHNOLOGY	CORE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The fundamental concepts of Open Source Technology
- learn the setting up environment of MongoDB and Python for data exploration
- apply advanced Python techniques for Data Analysis

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the key concepts in developing Open Source Software.	K2
CO2	Relate MongoDB with Python.	K2
CO3	Apply Scientific computing using Numerical Python.	K3
CO4	Implement Data Manipulation and Analysis using Pandas.	K4
CO5	Evaluate Data Visualization using Matplotlib.	K5

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	S
CO2	S	S	M	S	S
CO3	M	M	M	M	S
CO4	S	S	M	S	S
CO5	S	S	L	S	S

S Strong M Medium L Low

194CS2A3CA	OPEN SOURCE TECHNOLOGY	SEMESTER III

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Introduction to Open Source Development 10 h

Open Source Software: Introduction - Need For Open Source Applications: Advantages and Disadvantages - History - Meaning and Extraction of the Terms Free Software and Open Source Software - Free Software Foundation and Open Source Initiative Presentation - Security and Reliability - Economical Aspects and Adoption - Applications of Open Source Software. Python Basics: Setting up the Environment - Syntax of Python - Data Types: Numbers - Strings - Tuples and Sequences - List - Dictionaries - Sets - Conditional Statements - Loops.

Unit II MongoDB with Python 10 h

Getting Started with MongoDB: Installing - Running - Setting up a Python Environment with MongoDB. Reading and Writing to MongoDB with Python: Connecting to MongoDB with Python - Getting a Database Handle - Inserting a Document into a Collection - Write to a Collection Safely and Synchronously - Guaranteeing Writes to Multiple Database Nodes - MongoDB Query Language - Reading, Counting and Sorting - Updating - Deleting Documents from a Collection - MongoDB Query Operators - MongoDB Update Modifiers.

Unit III Advanced Python: Numpy 10 h

Python's World: Python Distributions: Anaconda. PyPI - The Python Package Index - The IDEs for Python: IDLE (Integrated Development Environment) - Spyder - Eclipse. SciPy: Numpy - Pandas - Matplotlib. The NumPy Library: History - The NumPy Installation - Ndarray: The Heart of the Library: Create an Array - Types of Data - The dtype Option - Intrinsic Creation of an Array - Basic Operations - Indexing, Slicing and Iterating - Conditions and Boolean Arrays - Shape Manipulation - Array Manipulation - General Concepts - Structured Arrays - Reading and Writing Array Data on Files.

Unit IV Pandas 9 h

Pandas: The Python Data Analysis Library: Installation- Getting Started with pandas - Pandas Data Structures : The Series - The Data Frame - The Index Objects - Other Functionalities on Indexes - Operations between Data Structures : Flexible Arithmetic Methods - Operations between Data Frames and Series - Function Application and Mapping - Sorting and Ranking - Correlation and Covariance - "Not a Number" Data. Pandas: Reading and Writing Data: CSV and Textual Files - Reading Data in CSV or Text Files - Reading and Writing HTML Files - Reading Data from XML - Reading and Writing Data on Microsoft Excel Files - JSON data.

Unit V Data Visualization using Matplotlib 9 h

Data Visualization with matplotlib : The matplotlib Library – Installation - matplotlib Architecture: Backend Layer - Artist Layer - Scripting Layer (pyplot) - pylab and pyplot. Using the kwargs: Working with Multiple Figures and Axes. Adding Further Elements to the Chart: Adding Text - Adding a Grid - Adding a Legend. Saving Your Charts: Saving the Code - Converting Your Session as an HTML File - Saving Your Chart Directly as an Image. Handling Date Values - Chart Typology - Line Chart - Histogram - Bar Chart: Horizontal Bar Chart - Multiseries Bar Chart with Pandas DataFrame - Pie Charts - mplot3d.

Text Books

1. Rao M.N., 2015, "Fundamentals of Open Source Software", 1st Edition, PHI Learning Private Limited. (Unit I)
2. Niall O'Higgins, 2011, "MongoDB and Python", 1st Edition, O'Reilly(Unit –II)
3. Fabio Nelli, (2015), Python Data Analytics Data Analysis and Science Using Pandas, Matplotlib, and the Python Programming Language, 1st Edition, APRESS(Unit-III to Unit – V)

References

1. RachnaKapur, Mario Briggs, Tapas, Saha, Ulisses Costa, Pedro Carvalho, Raul F. Chong, Peter Kohlmann, (2010), Getting started with Open source development, 1st Edition, IBM Corporation
2. Wes McKinney, Python, 2018, "For Data Analysis Data Wrangling with Pandas, NumPy, and IPython", 2nd Edition, O'Reilly
3. David Hows, EelcoPlugge, PeterMembrey, TimHawkins, 2013, "The Definitive Guide to MongoDB: A Complete Guide to Dealing with Big Data Using MongoDB", 2nd Edition, APRESS.

Course Code	Course Name	Category	L	T	P	Credit
194CS2A3CB	BIG DATA ANALYTICS	CORE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The basic concepts of Data Analytics.
- Perform data exploration operation using R language.
- Emphasis on performing Text Mining functions for handling unstructured documents.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand Big Data and Big Data Analytics.	K2
CO2	Remember Hadoop and basics of R.	K1
CO3	Implement R scripts for performing data handling functions.	K3
CO4	Categorize Decision Trees and Time Series Analysis in R.	K4
CO5	Demonstrate Clustering and Text Mining functions in R.	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	S
CO2	M	M	M	S	M
CO3	S	S	M	S	S
CO4	M	M	M	S	S
CO5	S	M	S	M	S

S Strong M Medium L Low

194CS2A3CB	BIG DATA ANALYTICS	SEMESTER III

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Introduction to Big Data Analytics 10 h

Types of Digital Data: Classification of Digital Data. Introduction to Big Data: Characteristics of Data - Evolution of Big Data - Definition of Big Data - Challenges with Big Data - Volume, Velocity and Variety - Other Characteristics of Data Which are not Definitional Traits of Big Data - A typical Data Warehouse Environment - A typical Hadoop Environment. Big Data Analytics: Data Science - Terminologies used in Big Data Environments.

Unit II Hadoop Environment and Introduction to R 10 h

Introducing Hadoop - History of Hadoop - Hadoop Overview - Use case of Hadoop - Hadoop Distributors - Hadoop Distributed File System (HDFS) - Processing Data with Hadoop - Managing Resources and Applications with Hadoop YARN - Interacting with Hadoop Ecosystem. Introduction to R: Downloading and Installing R - IDE's and Text Editors - Handling Packages in R - Working with Directory - Data types in R - Few commands for Data Exploration.

Unit III Loading, Data Handling and Exploring Data in R 10 h

R Expression, Variables and Functions - Missing Values Treatment in R – Vectors – Matrices – Factors – List - Simple Analysis using R - Methods of Reading Data. Exploring Data: Introduction -Data Frames - R function for Understanding Data in Data Frames - Load Data Frames - Exploring Data - Data Summary - Finding the Missing Values - Invalid Values and Outliers - Descriptive Statistics - Spotting Problems in Data with Visualization.

Unit IV Decision Trees and Time Series Analysis 9 h

Introduction: Terminologies Associated with Decision Trees - Decision Tree Representation in R - Appropriate problems for Decision Tree Learning - Basic Decision Tree Learning algorithms - ID3 Algorithm - Measuring Features. Case Study: Helping Retailers Predict In-store Customer Traffic. Time Series: Time Series Data-Reading Time Series Data-scan() Function-ts() Function - Plotting Time Series Data - Decomposing Time Series Data. Case Study: Insurance Fraud Detection.

Unit V Clustering and Text Mining 9 h

Introduction: Clustering Definition - Basic concepts in Clustering - Hierarchical Clustering - k means algorithm. Case Study: Personalized product recommendations. Text Mining: Introduction, Definitions of Text Mining, A Few

Challenges in Text Mining - Text Mining Vs Data Mining - Text Mining in R - General Architecture of Text Mining Systems - Preprocessing of Documents in R - Core Text Mining Operations - Text Mining Query Languages.

Text Books

1. Seema Acharya, Subashini Chellapan, 2015, "Big Data and Analytics", 2nd Edition, Wiley India Private Limited (Unit I and Unit II (2.1 to 2.9).

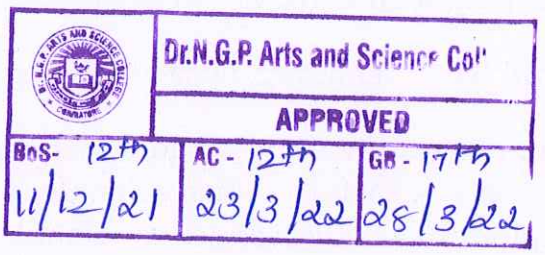
2. Seema Acharya, 2018, "Data Analytics Using R" ,1st Edition, Tata McGraw Hill Education (Unit II (2.10 to 2.15), Unit III, Unit IV and Unit V).

References

1. Bart Baesens, 2014, "Analytics in a Big Data World: The Essential Guide to Big Data and its Applications", 1st Edition, Wiley India Private Limited.

2. Simon Walkowiak, 2016, "BigData Analytics with R", Kindle Edition, Packt Publishing.

3. Arshdeep Bahga, Vijay Madisetti, 2018, "Big Data Analytics with R and Hadoop", 1st Edition, VPT.



Course Code	Course Name	Category	L	T	P	Credit
194CS2A3CC	SOFTWARE PROJECT MANAGEMENT	CORE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- Awareness regarding the theoretical and methodological aspects in software project management.
- To learn numerous process models for choosing the appropriate projects.
- Understand the required skills for managing projects, project teams, and stakeholder.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Remember the process of Software Project Management.	K1
CO2	Identify the theoretical and methodological issues involved in modern Software Project Management.	K1
CO3	Prepare the activity planning and evaluate the risks involved in it.	K3
CO4	Analyze project monitoring activities.	K4
CO5	Develop quality products by working as a team.	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	M	M	S	M	M
CO2	M	M	S	M	M
CO3	M	M	M	M	M
CO4	M	L	M	L	M
CO5	M	S	S	S	M

S Strong M Medium L Low

194CS2A3CC	SOFTWARE PROJECT MANAGEMENT	SEMESTER III

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Introduction to Software Project Management (SPM) 10 h

Importance of SPM - Definition of Project - Software Project Vs Other Types of Project - Contract Management and Technical Project Management - Activities Covered by SPM - Plans, Methods and Methodologies - Some Ways of Categorizing Software Projects – Stakeholders - Setting Objectives - The Business Case - Project Success and Failure - Definition of Management - Management Control - Traditional Vs Modern Project Management Practices. An overview of Project Planning: Step 0 to Step 10. Project Evaluation: A Business Case - Project Portfolio Management - Evaluation of Individual Projects - Cost-benefit Evaluation Techniques - Risk Evaluation.

Unit II Selection of Appropriate Project Approach 9 h

Choosing Methodologies and Technologies - Choice of Process Models - The Waterfall Model - The Spiral Model - Software Prototyping - Agile Methods - Extreme Programming (XP) - Selecting the Most Appropriate Process Model. Software Effort Estimation: The Basis for Software Estimating - Software Effort Estimation Techniques - Bottom-up Estimating - The Top-down Approach and Parametric Models - Estimating by Analogy - COCOMO Parametric Productivity Model. Resource Allocation: The Nature of Resources - Identifying Resource Requirements - Scheduling Resources - Creating Critical Paths - Counting the Cost - Being Specific.

Unit III Activity Planning 9 h

The Objectives of Activity Planning - Project Schedules - Projects and Activities - Sequencing and Scheduling Activities - Network Planning Model - Formulating a Network Model – The Forward Pass – The Backward Pass - Identifying the Critical path - Activity Float – Shortening the Project Duration - Identifying Critical Activities - Activity-on-Arrow Networks. Risk Management: Definition of Risk - Categories of Risk - Risk Identification - Risk Assessment - Risk Planning - Risk Management - Evaluating Risks to the Schedule - Applying the PERT Technique - Critical Chain Concepts.

Unit IV Monitoring and Control 10 h

Creating the Framework - Collecting the Data - Visualizing Progress - Cost Monitoring - Earned Value Analysis - Prioritizing Monitoring - Getting the Project Back to Target - Change Control. Managing Contracts: Types of Contract - Stages in Contract Placement - Typical Terms of a Contract – Contract Management -

Acceptance. Managing People in Software Environments: Understanding Behavior - Organization Behavior: A Background - Selecting the Right Person for the Job - Instruction in the Best Methods - Motivation - The Oldham-Hackman Job Characteristics Model - Stress - Health and Safety - Some Ethical and Professional Concerns.

Unit V Team Work 10 h

Working in Teams: Becoming a Team - Decision Making - Organizational Structures - Coordination Dependencies - Dispersed and Virtual Teams - Communication Genres - Communication Plans - Leadership. Software Quality: The Place of Software Quality in Project Planning - The Importance of Software Quality - Defining Software Quality - Product versus Process Quality Management - Quality Management Systems - Process Capability Models - Techniques to Help Enhance Software Quality – Testing - Quality Plans. Case Study: Budgeting to Business Beginnings.

Text Books

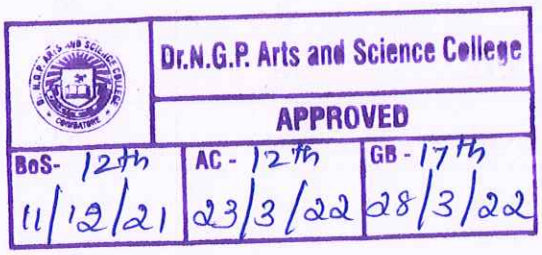
1 Bob Hughes, Mike Cotterell, Rajib Mall, 2017 , "Software Project Management", 6th Edition, Tata McGraw Hill.

References

1 Adolfo Villafiorita, 2014, "Introduction to Software Project Management", CRC Press.

2 S.A. Kelkar, 2013, "Software Project Management A Concise Study", 3rd Edition,PHI Learning Private Limited.

3 Bharat Bhushan Agarwal, Shivangi Dhall, Sumit Prakash Tayal, 2011, "Software Project Management", 1st Edition, University Science Press Pvt. Ltd.



Course Code	Course Name	Category	L	T	P	Credit
194CS2A3CD	RESEARCH METHODOLOGY	CORE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- the fundamental concepts of Research Methodology.
- learn different types of data collection methods for solving research problems.
- Emphasis on doing Research paper and Thesis Writing.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the basic concepts of research problem and research design.	K2
CO2	Understand the measurement and scaling techniques.	K2
CO3	Experiment different data collection methods for doing research process.	K4
CO4	Demonstrate Sampling and Hypothesis Testing.	K3
CO5	Develop Research Paper and Thesis Writing skills.	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	M	M	S
CO2	M	S	L	S	S
CO3	S	M	M	S	S
CO4	M	L	L	M	S
CO5	S	L	L	M	S

S Strong M Medium L Low

in Applying Chi-Square Test - Important Characteristics of Chi-Square Test.

Unit V Preparation of Thesis and Research Papers 9 h

The IMRAD (Introduction, Materials and Methods, Results and Discussion) Structure for Research Reporting – The Structure of a Thesis – Formatting Requirements of a Thesis – Thesis Editing – Research Papers – Selecting a Journal – The Structure of a Research Paper – Other Considerations in the Preparation of Articles – Review and Peer Review – Copyediting and Proofreading – Review Papers – Conference Papers – Electronic Publications – Short notes and Other Forms of Reports – Publish and Flourish.

Text Books

1 Kothari C.R., Gaurav Garg, 2019, "Research Methodology Methods and Techniques", 4th Edition, New Age International Publishers (Unit I to Unit IV).

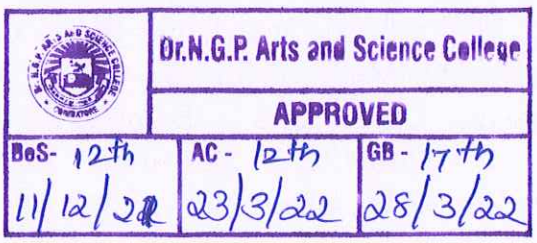
2 George Thomas C., 2015, "Research Methodology and Scientific Writing", 1st edition, Ane Books Pvt. Ltd. (Unit V).

References

1 Dr.Shanthi Bhusan Mishra, Dr.ShashiAlok, 2019, "Handbook of Research Methodology", 1stEdition, Edu creation Publishing.

2 Dr.Prabhat Pandey, Dr.Meenu Mishra Pandey, 2015, "Research Methodology: Tools and Techniques", 1st Edition, Bridge Center.

3 Ranjit Kumar, 2014, "Research Methodology - A Step by Step Guide for Beginners", 3rd Edition, Sage Publications.



194CS2A3CD	RESEARCH METHODOLOGY	SEMESTER III

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Introduction of Research 10 h

Meaning - Objectives - Motivation - Types - Research Approaches - Significance of Research - Research Methods Vs Methodology - Research and Scientific Method - Importance of Knowing How Research is Done - Research Process - Criteria of Good Research. Defining the Research Problem: Definition - Selecting the Problem - Necessity of Defining the Problem - Technique Involved in Defining a Problem. Research Design: Meaning - Need for Research Design - Features of Good Design - Important Concepts Relating to Research Design - Different Research Designs - Basic Principles of Experimental Designs.

Unit II Sampling Design, Measurement and Scaling Techniques 10 h

Sampling Design: Census and Sample Survey - Implications of a Sample Design - Steps in Sampling Design - Criteria of Selecting a Sampling Procedure - Characteristics of a Good Sample Design - Different Types of Sample Designs. Measurement and Scaling: Measurement in Research - Measurement Scales - Sources of Error in Measurement - Tests of Sound Measurement - Technique of Developing Measurement Tools - Scaling - Meaning of Scaling - Scale Classification Bases - Important Scaling Techniques - Scale Construction Techniques.

Unit III Data Collection, Processing and Analysis 9 h

Methods of Data Collection: Collection of Primary Data - Observation Method - Interview Method - Collection of Data through Questionnaires - Collection of Data through Schedules - Difference between Questionnaires and Schedules - Some Other Methods of Data Collection - Collection of Secondary Data - Selection of Appropriate Method for Data Collection. Processing and Analysis of Data: Processing Operations - Some Problems in Processing - Elements/Types of Analysis - Statistics in Research - Measures of Central Tendency - Measures of Dispersion - Measures of Asymmetry (Skewness) - Measures of Relationship.

Unit IV Sampling, Hypothesis Testing and Chi-Square Test 10 h

Sampling Fundamentals: Need - Definitions - Important Sampling Distributions - Sampling Theory - Estimation - Estimating the Population Mean - Estimating Population Proportion - Sample Size and its Determination. Testing of Hypotheses: Definition - Basic Concepts - Procedure - Flow Diagram - Measuring the Power of a Hypothesis Test - Tests of Hypotheses - Important Parametric Tests. Chi-Square T... Chi-square as a Test for Comparing Variance - Chi-square as a Non ...etric Test - Conditions for the application of Chi-square Test - Steps involved

194CS2A3CP	OPEN SOURCE TECHNOLOGY	SEMESTER III

Total Credits: 2
Total Instructions Hours: 60 h

S.No	List of Experiments
1	a. Download and Install current version of Python from the Open Source community. b. Write a Python program to implement Conditional Statements and Loops.
2	Implement a Python program to perform List operations.
3	Build Student Database and perform data manipulation operations using MongoDB.
4	Write a Python script to connect Student Database with MongoDB and perform data storage and retrieval functions.
5	Develop a Python script to perform basic operations using NumPy.
6	Create a structured array for the Students details which includes Student id, Student name, Height, Class and their data types to perform the following operations in it. a) Sort the array by height b) Sort by class and height if classes are equal c) Based on height of the students in canonical order sort the student id and display their indices. d) Sort the student id with increasing height of the students from given students id and height. Display the indices that describes the sort order
7	Build a DataFrame in Python and display the specific dictionary data includes index and labels to perform: a) Display the summary details b) Count the number of rows and columns c) Select the specific rows and columns d) Count the number of rows with NaN values e) Iterate the DataFrame to display the specific rows
8	Build a Dataset in Excel file and create a Python script to import Dataset into Pandas DataFrame and perform Read / Sort / Export operations in it.
9	Create a dictionary to CSV file and perform read / write and display

operations in it.

10	Load the 'datasets/exam-scores/exam-scores.csv' into a pandas DataFrame called scores and perform the following: a) Filter the scores for exam version 'D'. b) Fetch the columns 'Made Own Study Guide' and 'Student Score' from the exam-score dataset. Perform pre-processing operations and store the result into a new DataFrame as Study c) Load the Study DataFrame and transform the categorical values into numerical values
11	Write a Python script to read a CSV file from the below link, (https://raw.githubusercontent.com/mwaskom/seaborn-data/master/diamonds.csv). Perform the following operations in it. a) Read a Dataset, modify their columns and display the first 6 rows b) Remove single / multiple columns from diamonds DataFrame and display the result c) Sort by 'carat' series in diamonds DataFrame. d) Display the diamonds which satisfy the condition Fair / Good / Premium e) Compute count, minimum, maximum price for each cut of diamonds in a Data Frame. f) Display the unique values in a cut series of diamonds DataFrame.
12	Build CSV file for a company sale data. Perform the following operation in it. a) Draw multiline plots for the number of units sold per month of each product b) Plot a histogram chart for the total profit of each month c) Draw a barchart for any sale product of all months.

Note: Any 10 experiments are mandatory

194CS2A3CQ	BIG DATA ANALYTICS USING R	SEMESTER III

Total Credits: 2
Total Instructions Hours: 60 h

S.No	Contents
1	Create Structured / Semi-structured documents to store the basic information about students such as roll no, name, date of birth and address of student perform data manipulation operations in it.
2	Write an R script to (i) Calculate the Factorial of a given number (ii) Fibonacci Series and (iii)Find the factors of a given number.
3	Develop an R script to perform mapreduce operations.
4	Build an R script to count the number of words in a text file using RHadoop package.
5	Write an R script to perform (i) Vector Manipulation Operations. (ii) Matrix Operations.
6	Create an array of two 3x3 matrices each with 3 rows and 3 columns from two given two vectors. Print the second row of the second matrix of the array and the element in the 3rd row and 3rd column of the 1st matrix.
7	Develop R script to (i) Create a list and convert the list created into a vector. (ii) Create a Data frame and perform various operations on it.
8	Demonstrate an R script (i) To perform data import/export (.CSV, .XLS, .TXT) operations using data frames (ii) Read a csv file and explore the data using various Data Visualization techniques.
9	Construct a decision tree using ID3 algorithm and visualize for irisdataset.
10	Write an R script to predict the rainfall of a particular region using time series data.
11	Implement a clustering algorithm for personalized product

recommendations.

12 Perform Text Mining preprocessing operations on unstructured documents.

Note: Any 10 experiments are mandatory.

Course Code	Course Name	Category	L	T	P	Credit
194CS2A3DA	MACHINE LEARNING	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The fundamental concepts of Machine Learning algorithms.
- learn about Artificial Neural Networks and Convolutional Neural Networks.
- Familiarize with Human Computer Interaction system.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand ideas and concepts of Machine Learning.	K2
CO2	Demonstrate the importance of Decision trees using Weka.	K3
CO3	Analyze Perceptrons Learning Algorithms.	K4
CO4	Apply different approaches of Support Vector Machine and Clustering Techniques.	K3
CO5	Classify various stages in Natural Language Processing.	K4

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	M	M	M	M	S
CO2	M	L	L	M	S
CO3	S	M	L	L	S
CO4	M	M	M	M	S
CO5	S	M	M	M	S

S Strong M Medium L Low

194CS2A3DA	MACHINE LEARNING	SEMESTER III

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Machine Learning Basics 10 h

Introduction: Definition of Machine Learning - History of Machine Learning - Algorithm Types for Machine Learning: Supervised Learning and Unsupervised Learning - Human Touch - Uses of Machine Learning - Data Repositories. Planning for Machine Learning: The Machine Learning Cycle - Defining the Process - Building a Data Team - Data Processing - Data Storage - Data Privacy - Data Quality and Cleaning - Thinking about Input Data - Thinking about Output Data.

Unit II Classification Technique 10 h

Working with Decision Trees: The Basics of Decision Trees: Uses for Decision Trees - Advantages of Decision Trees - Limitations of Decision Trees - Different Algorithm Types - Working of Decision Tree - Decision Trees in Weka: The Requirement - Training Data - Using Weka to Create a Decision Tree. Bayesian Networks: Pilots to Paperclips - A Little Graph Theory - A Little Probability Theory - Bayes' Theorem - Working of Bayesian Networks - Node Counts - Using Domain Experts - A Bayesian Network Walkthrough.

Unit III Expert Systems 10 h

Artificial Neural Networks: Definition of Neural Network - Artificial Neural Network Uses - Breaking Down the Artificial Neural Network: Perceptrons - Activation Functions - Multilayer Perceptrons - Back Propagation - Data Preparation for Artificial Neural Networks - Artificial Neural Networks with Weka. Case Study: Convolutional Neural Networks (CNNs). Association Rule Learning: Usage of Association Rule Learning - Working of Association Rule Learning: Support - Confidence - Lift - Conviction - Defining the Process - Algorithms: Apriori - FP-Growth – Mining the Baskets – A Walk through.

Unit IV Discriminative Classifier and Clustering 9 h

Support Vector Machines: Definition of Support Vector Machine – Usages of Support Vector Machine – The Basic Classification Principles: Binary and Multiclass Classification – Liner Classifiers – Confidence – Maximizing and Minimizing to Find the Line – Approaches of Support Vector Machine Classification: Linear Classification – Non-Linear Classification – Using Support Vector Machines in Weka – Installing LibSVM – A Classification Walkthrough. Clustering: Definition of Clustering – Usage of Clustering – Clustering Models – K-Means Clustering with

Unit V Natural Language Processing (NLP) 9 h

Introduction to NLP: Text Analytics and NLP – Various Steps in NLP: Tokenization – PoS Tagging – Stop Word Removal – Text Normalization – Spelling Correction – Stemming – Lemmatization – NER – Word Sense Disambiguation – Sentence Boundary Detection – Kick Starting an NLP Project: Data Collection – Data Processing – Feature Extraction – Model Development – Model Assessment – Model Deployment. Basic Feature Extraction Method: Types of Data – Cleaning Text Data – Feature Extraction from Texts: Extracting General Features from Raw Text - Bag of Words – TF-IDF.

Text Books

1 Jason Bell, 2015, "Machine Learning Hands-on for Developers and Technical Professionals", 1st Edition, Wiley (Unit 1 to Unit 4).

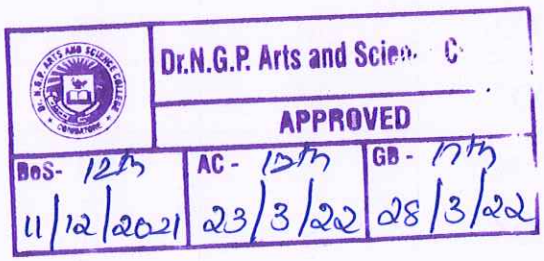
2 Sohom Ghosh and Dwight Gunning, 2019, "Natural Language Processing Fundamentals", 1st Edition, Packt Publishing Ltd (Unit 5)

References

1 Suresh Samudrala, 2018, "Machine Intelligence: Demystifying Machine Learning, Neural Networks and Deep Learning", Notion Press.

2 Bhem Alpaydin, 2014,"Introduction to Machine Learning", 3rd Edition, The MIT Press, Cambridge.

3 Gavin Hackeling, 2014, "Mastering Machine Learning with Scikit-learn", Packt Publishing.



Course Code	Course Name	Category	L	T	P	Credit
194CS2A3DB	SOFT COMPUTING	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- Understand the basic concepts of Soft Computing.
- In-depth learning of Neural Network concepts and Techniques.
- Enrich skills in the areas of Evolutionary Computing.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Remember the fundamentals of Soft Computing.	K1
CO2	Review in Fuzzy Logic and Interference rules.	K2
CO3	Derive possibility Theory in Neural Networks.	K2
CO4	Develop Multi-Layered Feed Forward Neural Networks.	K3
CO5	Analyze the performance of Evolutionary Computing.	K4

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	M	M	M	S	M
CO2	M	M	M	S	S
CO3	M	M	M	M	S
CO4	S	M	M	S	S
CO5	S	S	S	M	M

S Strong M Medium L Low

194CS2A3DB	SOFT COMPUTING	SEMESTER III

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Introduction to Soft Computing 9 h

Introduction: Hard Computing versus Soft Computing – Constituents of Soft Computing: Fuzzy Logic – Artificial Neural Networks – Evolutionary Computing – Machine Learning. Crisp and Fuzzy Sets - Classical or Crisp Set Theory: Basics Definition and Terminology – Operations – Properties of Crisp Sets - Crisp Relations and Operations: Basics Definition and Terminology - Operations – Composition of Crisp Relations - Fuzzy Sets Theory: Definitions and Terminologies – Operations on Fuzzy Sets – Fuzzy Relations – Composition of Fuzzy Relations – Types of Membership Functions – Features of Fuzzy Membership Functions.

Unit II Fuzzy Logic and Interference Rules 10 h

Classical Logic: Boolean Connectives – Propositional Logic – Predicate Logic - Multi-valued Logic: Three-valued Logic – n-Valued Logic. Fuzzy Logic: Fuzzy Predicate – The Linguistic Variable – Fuzzy Modifiers – Fuzzy Truth-values – Fuzzy Quantifiers - Fuzzy Propositions – Unconditional and Unqualified - Unconditional and Qualified - Conditional and Unqualified - Conditional and Qualified Proposition. Fuzzy Inference Systems: Fuzzification Process – Interference (Implication) Process – Defuzzification Process – Types of Fuzzy Inference Engines: Mamdani Fuzzy Inference System – Sugeno Fuzzy Inference System – Tsukamoto Fuzzy Inference System - Neuro-Fuzzy System.

Unit III Rough Set, Possibility Theory and Neural Network 10 h

Rough Set: Rough Set with Approximation – Rough Set with Membership Function - Information System: Dependency of Attributes – Reduction of Attributes – Possibility Theory: Formalization of Possibility – Formalization of Necessity using Possibility. Single-Layer Feed-Forward Neural Network: Biological Neurons – Artificial Neural Network: Artificial Neuron Model – Artificial Neural Network Model: Neuron Model – Simple Perceptron – Perceptron Examples – Limitations of Perceptron - Single-layer Feed-forward Neural Network: Learning Process in Single-layer Feed-forward Network - Applications of Neural Networks.

Unit IV Multi-Layered Feed-Forward Neural Network 10 h

Multi-Layer Feed-Forward Neural Network (FFNN) Architecture: Processing at a Node. Learning Methods: Gradient Descent Learning - Backpropagation Method: Backpropagation Training Algorithm – Weight Updation Method – Detailed ...ng Algorithm – Problems with weight Propagation - Design Issues of ...ial Neural Network – Data Representation – Network Topology – Network

Parameters – Training Dataset. Hybrid Intelligent System: Neuro-fuzzy Systems: Fuzzy Systems – Neural Networks - Models of Neuro-fuzzy Systems: Categories of Neuro-fuzzy Systems –Hybrid Neuro-fuzzy System - Interpretation of Neuro-fuzzy System.

Unit V Evolutionary Computing 9 h

Evolutionary Algorithm – Swarm Intelligence - Paradigms of Evolutionary Computing: Genetics Algorithms – Genetic Programming (GP) - Evolutionary Strategies – Evolutionary Programming – Advantages of Evolutionary Computation. Genetic Algorithm Processes: Genetic Algorithm – Pseudo Algorithm for Genetic Algorithm - Selection of Parents. Swarm Intelligence: Overview – Particle Swarm Optimization: Functioning of Particle Swarm Optimization. Machine Learning: Machine-learning Systems – Supervised and Unsupervised Learning: Supervised Learning – Unsupervised Learning – Reinforcement Learning. Applications of Machine Learning.

Text Books

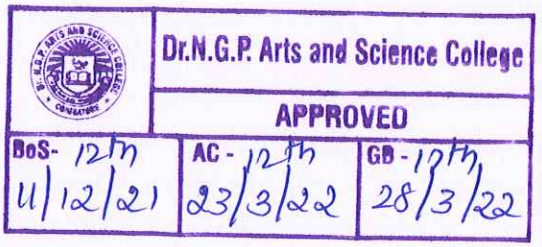
1 Saroj Kaushik, Sunita Tiwari, 2018, "Soft Computing: Fundamentals, Techniques and Applications", 1st Edition, Tata McGraw-Hill.

References

1 Charu C. Aggarwal, 2018, "Neural Networks and Deep Learning: A Textbook", Springer.

2 Rajasekaran. S and Vijayalakshmi Pai, 2017, "Neural Networks, Fuzzy Logic and Genetic Algorithms Synthesis and Application", 2nd Edition, Prentice Hall of India Pvt. Ltd.

3 Samir Roy and Udit Chakraborty, 2013, "Introduction to Soft Computing, Pearson".



Course Code	Course Name	Category	L	T	P	Credit
194CS2A3DC	DISTRIBUTED OPERATING SYSTEM	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The fundamental concepts of Distributed Operating Systems.
- learn about Distributed Shared Memory Strategies.
- grasp knowledge in Resource Management.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the basics of Message Passing System.	K2
CO2	Relate Interprocess Communication and Exception Handling Mechanism.	K2
CO3	Review the architecture and implementation of Shared Memory and Synchronization.	K3
CO4	Summarize the concepts of Resource management and Process management.	K3
CO5	Emphasis on Naming schemes and security approaches.	K4

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	M	M	L
CO2	S	M	S	M	M
CO3	M	S	M	M	M
CO4	M	M	M	S	M
CO5	M	M	S	S	S

S Strong M Medium L Low

194CS2A3DC	DISTRIBUTED OPERATING SYSTEM	SEMESTER III

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Introduction 9 h

Fundamentals: Definition of Distributed Computing System - Evolution - Definition of Distributed Operating System - Issues - Introduction to Distributed Computing Environment (DCE): Definition of DCE. Message Passing: Desirable Features of a Good Message Passing System - Synchronization – Buffering - Multidatagram Messages - Encoding and Decoding of Message Data - Process Addressing - Failure Handling.

Unit II Interprocess Communication 9 h

Remote Procedure Calls (RPCs): The RPC Model - Transparency of RPC - Implementing RPC Mechanism - Stub Generation - RPC Messages - Server Management – Parameter-Passing Semantics – Call Semantics - Communication Protocols for RPCs – Client-Server Binding - Exception Handling – Security - Some Special Types of RPCs - RPC in Heterogeneous Environments - Lightweight RPC - Optimizations for Better Performance.

Unit III Shared Memory and Synchronization 10 h

Distributed Shared Memory (DSM): General Architecture of DSM Systems - Design and Implementation Issues of DSM – Granularity - Structure of Shared Memory Space - Replacement Strategy – Thrashing - Other Approaches to DSM - Heterogeneous DSM - Advantages of DSM. Synchronization: Clock Synchronization: How Computer Clocks Are Implemented - Drifting of Clocks - Clock Synchronization Issues - Event Ordering - Mutual Exclusion – Deadlock.

Unit IV Resource Management 10 h

Resource Management - Desirable Features of a Good Global Scheduling Algorithm - Task Assignment Approach - Load Balancing Approach: A Taxonomy of Load Balancing Algorithms - Load Sharing Approach - Issues. Process Management: Process Migration: Features - Process Migration in Heterogeneous Systems - Advantages - Threads: Motivations for Using Threads - Models for Organizing Threads. Distributed File System: Features - File Models - File Accessing Models - File Sharing Semantics - File Caching Schemes: Cache Location - Modification Propagation - File Replication: Difference between Replication and Caching - Advantages - Replication Transparency – Fault Tolerance.

Unit V Naming and Security 10 h

Naming: Features - Fundamental Terminologies and Concepts – System-Oriented Names - Object Locating Mechanism - Human Oriented Names: Human Oriented Hierarchical Naming Schemes - Names Caches: Types of name Caches - Naming and Security. Security: Potential Attacks to Computer Systems: Passive Attacks - Active Attacks – Cryptography: Basic concepts and Terminologies - Basic Requirements - Symmetric and Asymmetric Cryptosystem - Authentication: Approaches to Authentication - User Login Authentication - Access Control: Protection Domains - Digital Signatures - Design Principles. Case Study: A Comparison of Amoeba, V-System, Mach and Chorus.

Text Books

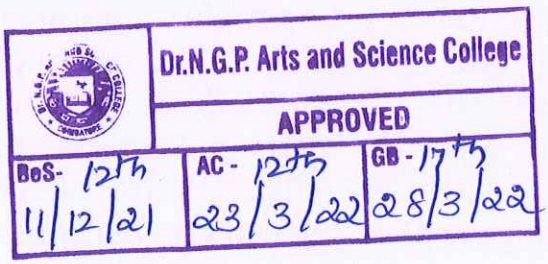
1 Pradeep K. Sinha, 2012, "Distributed Operating Systems: Concepts and Design", PHI Learning Private Limited.

References

1 Randy Chow, Theodore Johnson, 2009 , "Distributed Operating Systems and Algorithm Analysis", 1st Edition, Pearson.

2 Andrew S. Tanenbaum, 2008, "Distributed Operating Systems",1st Edition, Pearson

3 Coulouris G., Dollimore J., and Kindberg T., 2001, "Distributed Systems: Concepts &Design", 3rd Edition, Addison-Wesley.



194CS2ASSA	IPR AND ENTREPRENEURSHIP	SEMESTER III

Total Credit: 1

Syllabus

Unit I Intellectual Property and World Trade Organization (WTO)

Introduction: Definition of Intellectual Property - Introduction of WTO. Agreement on TRIPS (Trade Related Intellectual Property Rights): General Provisions and Basic Principles of TRIPS - Standards Concerning the Availability, Scope and Use of Intellectual Property Rights - Enforcement of Intellectual Property Rights - Acquisition and Maintenance of Intellectual Property Rights and Related Inter-Partes Procedures - Dispute Prevention and Settlement - Transitional Arrangements- Institutional Arrangements, Final Provisions

Unit II Patent

Fundamentals of Patent: Definition - History of the Patent in India - Conditions for Grant of Patent – Inventions those are not Patentable - Process and Product Patent - Procedure for Grant of Patent – e-Filing of Patent Application - Temporal and Spatial Aspect of Patent - Opposition to Grant of Patent - Rights of Patentee - Patent Office and Register of Patents - PCT Patent - Exclusive Marketing Rights - Milestones in Indian Patent Law. Transfer and Infringement of Patent Rights: Transfer of Patent Rights - Infringement of Patent Rights - Patent Agents - Challenges in Patent.

Unit III Copyright and Trade Marks

Copyright: Definition - Meaning of Publication - Copyright Office and Copyright Board - Ownership of Copyright - The Rights of the Owner - Term of Copyright - Registration of Copyright - Infringement of Copyright - Remedies against Copyright Infringement - Internet and Copyright Issue. Trade Marks: Definition - Developing a Trade Mark - Conditions for Trade Mark Registration - Register of Trade Marks - Trends in Trade Marks Applications - Procedure for Trade Mark Registration in India - Term of Trade Mark - Certification Trade Mark - Infringement of Trade Mark - Remedies against Trade Mark Infringement.

Unit IV Significance of Entrepreneur

Basic Business Concepts for the Prospective Entrepreneur: Production Factors as Resources Needed When Starting an Enterprise - The Enterprise, Its Establishment and The Sectors- Profit and Other Objectives of an Entrepreneur - Informal and Formal Enterprises - Form of Enterprise for A Small Business - The Business Environment. Entrepreneurship and Entrepreneurial Skills: Definitions of an Entrepreneur - The Relationship between Entrepreneurship and Small Business Management - Key Characteristics of Successful Entrepreneurs - Entrepreneurial

Unit V Ideas for Start-up

The Identification of Feasible Small Business Ideas: Introduction - Cultivating a Creative Attitude - Generating Small Business Ideas: The Generation of Ideas from the Entrepreneur's Skills, Expertise and Aptitudes – Common Needs – Existing Problems – Everyday Activities – Other Sources - The Development and Evaluation of Small Business Ideas. The Business Plan: About the Business Plan – Contents of the Business Plan - The Entrepreneurial Team – Description of the Enterprise – The Objective and Strategy of the Enterprise.

Text Books

1 Neeraj Pandey, Khushdeep Dharani, 2014, "Intellectual Property Rights", PHI Learning Pvt. Ltd.

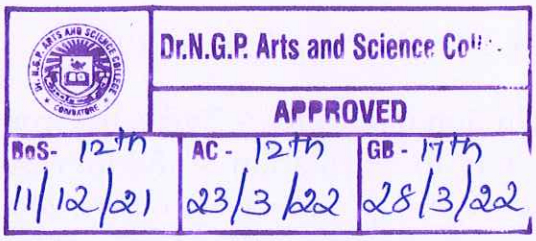
2 Nieuwenhuizen C, 2015, "Basics of Entrepreneurship", Juta Pvt. Ltd.

References

1 Deborah. E. Bouchoux, 2018, "Intellectual Property Right" 5th edition, Cengage Learning.

2 Robert D. Hisrich, Michael P. Peters, Dean A. Shepherd, 2018, "Entrepreneurship", 10th Edition, Tata McGraw Hill.

3 Prabuddha Ganguli, 2008, "Intellectual Property Right", 1st Edition, Tata McGraw Hill.



194CS2ASSB	ORGANISATIONAL BEHAVIOUR	SEMESTER III

Total Credits: 1

Syllabus

Unit I Nature and Scope of Organisation

Introduction - Concept of Organisation - Features - Types - Concepts of Organisational Typology and its Types - Significance of Organisation - Organisational Goals - Importance - Goal Formulation - Nature of Goals - Goal Changes - Individual and Organisational Goals - Conflict between Individual and Organisational Goals - Nature of Business Organization - Organisation Theory.

Unit II Organisational Behaviour]

PConcept and Meaning of Organisational Behaviour (OB) - Characteristics of OB - Key Elements / Forces of OB - Goal of OB - Philosophical Concepts of OB - Fundamental Concepts of OB - OB and Other Fields of Study - Role of OB - Historical Evolution of OB - Approaches to the Study of OB - Models of OB - Challenges and Opportunities of OB.

Unit III Individual Behaviour and Personality

Personal Factors - Environmental Factors - Organisational Factors - Models of Man / Individual Behaviour. Personality: The Meaning of Personality - Characteristics of Personality - Determinants of Personality - Development of Personality - Personality Traits - Major Traits Influencing Organisational Behaviour - Locus of Control - Matching Personality with Job Types.

Unit IV Group Functionalities

Definition of Groups - Types of Groups - Theories of Group Formation - Reasons for Group Formation - Factors Affecting Group Performance - Inter-Group Behaviour - Approaches to Inter-Group Relationship - Group Dynamic A Synoptic View. Group Decision Making: Meaning - Nature - Groups - Process - Steps - Styles - Advantages and Disadvantages.

Unit V Communication and Leadership

Communication: Definitions - Characteristics: Nature of Communication - Elements - Process - Models - Need or Purpose - Importance - Methods (Channels) - Inter Personal - Cross Cultural Communication. Leadership: Definitions - Nature and Characteristics - Leadership Vs Management -Leadership Styles - Formal and Informal Leaders - Leadership Functions - Importance of Leadership in Management - Process or Techniques of Effective Leadership.

Text Books

1 Shashi K Gopta, Rosy Joshi, 2014, "Organisational Behaviour", 9th Edition, Kalyani Publishers.

References

1 Khanka S.S., 2013, "Organisational Behaviour". 7th edition , Sultan Chand & Sons Publishing.

2 Stephen P. Robins, 2008 , "Organizational Behavior", 11th edition ,PHI Learning / Pearson Education, ,

3 Fred Luthans, 2010, "Organisational Behavior", 11th Edition, McGraw Hill.

Course Code	Course Name	Category	L	T	P	Credit
194CS2A4CA	ANDROID PROGRAMMING	CORE	4	1	0	4

PREAMBLE

This course has been designed for students to learn and understand

- Develop mobile applications using Android SDK
- Experiment with database to store and view data
- Demonstrate Location Based Services using Google Maps

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Ability to perform installation and configuration of Android application development tools	K2
CO2	Understand the fundamental building blocks of Android application	K2
CO3	Design and develop User Interfaces for the Android platform	K3
CO4	Explore views, pictures and menus in android application	K3
CO5	Apply techniques to store, retrieve data using SQLite database and demonstrate to build location based services	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	L	S	M
CO2	L	S	L	S	S
CO3	L	L	M	S	S
CO4	M	L	S	M	S
CO5	S	M	M	S	S

S Strong M Medium L Low

194CS2A4CA	ANDROID PROGRAMMING	SEMESTER IV

Total Credits: 4

Total Instruction Hours: 60 h

Syllabus

Unit I Introduction to Android Programming 12 h

Getting started with Android Programming: Definition of Android – Android Versions – Features of Android – Architecture of Android – Android Devices in the Market – Obtaining the Required Tools: Android Studio – Android SDK – Creating Android Virtual Devices (AVDs) – Launching your First Android Application. Using Android Studio for Android Development: Exploring the IDE – Using Code Completion – Debugging your Application: Setting Breakpoints – Navigating Paused Code – Publishing your Application.

Unit II Activities, Fragments and Intents 12 h

Understanding Activities: Applying Styles and Themes to an Activity – Hiding the Activity Title – Displaying a Dialog Window – Displaying a Progress Dialog – Linking Activities using Intents: Returning results from Intent – Passing Data Using an Intent Object – Fragments: Adding Fragments Dynamically – Life cycle of a Fragment – Interaction between Fragments – Understanding the Intent Object – Using Intent Filters – Displaying Notifications.

Unit III Android User Interface (UI) 12 h

Getting to Know the Android UI:Understanding the Components of a Screen: Views and View Groups – Frame Layout – Linear layout – Table Layout – Relative Layout – Frame Layout – Scroll View – Adapting to Display Orientation– Managing Changes to Screen orientation: Persisting State Information During Changes in Configuration – Detecting Orientation Changes – Controlling the Orientation of the Activity – Utilizing the Action Bar: Adding Action Items to the Action Bar – Creating the User Interface Programmatically – Listening for UI Notifications.

Unit IV Designing UI, Displaying Picture and Menus 12 h

Designing Your User Interface with Views: Using Basic Views: TextView View - Button, ImageButton, EditText, CheckBox, ToggleButton, RadioButton, and RadioGroup Views -ProgressBar View – AutoCompleteTextView View-Using Picker Views - Using List Views to Display Long Lists – Understanding Specialized Fragments. Displaying Pictures and Menus with Views: Using Image Views to Display Pictures:ImageView View – ImageSwitcher – GridView – Using Menus

with Views - Creating the Helper Methods - Options Menu - Context Menu - Using WebView.

Unit V Data Persistence and Location Based Services 12 h

Data Persistence: Saving and Loading User Preferences: Accessing Preferences Using an Activity - Programmatically Retrieving and Modifying the Preference Values - Persisting Data to Files: Saving to Internal Storage - Saving to External Storage (SD Card) - Choosing the best Storage Option - Creating and Using Databases: Creating the DBAdapter Helper Class - Using the Database Programmatically. Location Based Services: Displaying Maps - Getting Location Data - Monitoring a location.

Text Books

1 J. F. DiMarzio, 2016, "Beginning Android Programming with Android Studio", 4th Edition, John Wiley & Sons.

2 Reto Meier, 2012, "Professional Android 4 Application Development", 3rd Edition, Wiley.

References

1 B.M Harwani, 2013, "Android Programming", 1stEdition, Pearson Education

2 ZiguradMednieks, LaridDornin, G.BlakeMeike, Masumi Nakamura, 2013, "Programming Android", 2nd Edition, O'Reilly.

3 John Horton , "Android Programming for Beginners", 2nd Edition, Packt Publishing.

4 Ian G. Clifton, "Android user Interface Design - Turning Ideas and Sketches into Beautifully Designed Apps", 1st Edition, Addison Wesley.

Course Code	Course Name	Category	L	T	P	Credit
194CS2A4CB	WEB INTELLIGENCE	CORE	4	0	0	4

PREAMBLE

This course has been designed for students to learn and understand

- Enable the students to understand the Web Mining concepts.
- Provide adequate knowledge on Web Search and Web Structure mining.
- Learn about Emotion AI and Web Usage Mining.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Providing knowledge on the basic concepts of web mining.	K2
CO2	Ability to understand the Web Search and Web Crawling methods	K2
CO3	Use different concepts on Web Structure Mining and Social Network Analysis	K3
CO4	Learn about the Opinion Mining and Sentiment Analysis	K3
CO5	Apply the concept of Web Usage Mining	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	L	M
CO2	M	S	L	M	S
CO3	S	L	M	L	S
CO4	M	S	L	M	L
CO5	L	S	S	L	L

S Strong M Medium L Low

194CS2A4CB	WEB INTELLIGENCE	SEMESTER IV

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Fundamentals of Web Mining 9 h

Introduction: Definition of World Wide Web - A Brief History of the Web and the Internet -Web Data Mining: Definition of Data Mining - Definition of Web Mining. Web Mining: Information Retrieval and Web Search: Basic Concepts of Information Retrieval - Information Retrieval Models: Boolean Model - Vector Space Model - Statistical Language Model - Evaluation Measures - Text and Web Page Pre-Processing: Stopword Removal –Stemming - Other Pre-Processing Tasks for Text – Web Page Pre-Processing - Duplicate Detection - Inverted Index and its Compression: Inverted Index - Search Using an Inverted Index - Index Construction - Index Compression: Unary Coding.

Unit II Information Retrieval and Web Crawling 9 h

Information Retrieval and Web Search: Web Search - Meta-Search and Combining Multiple Rankings: Combination Using Similarity Scores - Combination Using Rank Positions - Web Spamming: Content Spamming - Link Spamming - Hiding Techniques - Combating Spam. Web Crawling: A Basic Crawler Algorithm: Breadth-First Crawlers - Preferential Crawlers - Implementation Issues: Fetching – Parsing - Stopword Removal and Stemming - Link Extraction and Canonicalization - Spider Traps - Page Repository – Concurrency - Universal Crawlers: Scalability - Coverage vs. Freshness vs. Importance - Focused Crawlers - Topical Crawlers: Topical locality and Cues.

Unit III Web Structure Mining and Social Network Analysis 10 h

Structured Data Extraction: Wrapper Generation: Preliminaries: Two Types of Data Rich Pages - Data Model - HTML Mark-up Encoding of Data Instances - Wrapper Induction: Extraction from a Page - Learning Extraction Rules - Identifying Informative Examples - Wrapper Maintenance - Building DOM Trees – Extraction Based on a Single List Page: Flat Data Records. Social Network Analysis: Centrality – Prestige - Co-Citation and Bibliographic Coupling - PageRank: Algorithm - Strengths and Weaknesses of PageRank - HITS: HITS Algorithm - Finding Other Eigenvectors - Relationships with Co-Citation and Bibliographic Coupling - Strengths and Weaknesses of HITS.

Unit IV Emotion AI 10 h

Opinion Mining and Sentiment Analysis: The Problem of Opinion Mining: Problem Definitions – Aspect-Based Opinion Summary - Document Sentiment Classification: Supervised Learning - Un-Supervised Learning - Sentence Subjectivity and Sentiment Classification - Opinion Lexicon Expansion - Aspect-Based Opinion Mining: Aspect Sentiment Classification – Basic Rules of Opinions - Aspect Extraction - Opinion Search and Retrieval - Opinion Spam Detection: Types of Spam and Spammers - Hiding Techniques - Spam Detection based on Abnormal Behaviors - Group Spam Detection - Utility of Reviews.

Unit V Web Usage Mining (WUM) 10 h

WUM: Data Collection and Pre-Processing - Sources and Types of Data - Key Elements of Web Usage Data Pre-Processing - Data Modeling for Web Usage Mining - Discovering and Analysis of Web Usage Patterns: Session and Visitor Analysis - Cluster Analysis and Visitor Segmentation - Association and Correlation Analysis - Analysis of Sequential and Navigational Patterns - Classification and Prediction based on Web User Transactions. Query Log Mining: Data Sources, Characteristics and Challenges - Query Log Data Preparation - Query Log Data Models - Query Log Feature Extraction.

Text Books

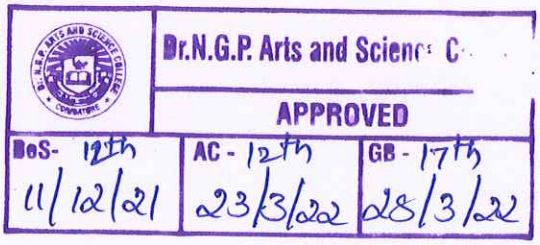
1 Bing Liu, 2011 ,"Web Data Mining Exploring Hyperlinks, Contents, and Usage Data" , 2nd Edition, Springer

References

1 Ricardo Baeza -Yates and Berthier Ribeiro-Neto, 2011, "Modern Information Retrieval: The Concepts and Technology behind Search", 2nd Edition, ACM Press Books.

2 Juan D.VelásquezLakhmi C. Jain (Eds.), 2010, "Advanced Techniques in Web Intelligence - 1 ", 1st Edition, Springer

3 Mark Levene, 2010, "An Introduction to Search Engines and Web Navigation", 2nd Edition, Wiley



194CS2A4CP	CORE PRACTICAL : ANDROID PROGRAMMING	SEMESTER IV

Total Credits: 2
Total Instructions Hours: 48 h

S.No	List of Experiments
1	Create an android application to create Login Page.
2	Create an android application to perform onClick, onKeyDown, onFocusChanged Event Handlers.
3	Create an android application to link activities using intents for a quiz application.
4	Create an android application to display notification for a meeting reminder.
5	Demonstrate calculator application using Table layout.
6	Create an android application to add search icon in action bar that performs search on listed book details.
7	Develop an android application that uses GUI components, Font and Colors.
8	Create an android application with Multiple Activities and a Simple Menu using ListView
9	Create an android application to display a catalogue of pictures for an e-commerce application.
10	Build an android application with android's advanced User Interface functions to obtain student feedback.
11	Create an android application to perform Data Storage and Retrieval operations from the external storage for an event registration.
12	Create an android application that displays current GPS location information.

Note: Any 10 experiments are mandatory

Dr.N.G.P. Arts and Science Co
APPROVED

BoS- 12th	AC - 12th	GB - 17th
11/12/21	23/3/22	28/3/22

194CS2A4CV	PROJECT WORK	SEMESTER IV

Total Credits: 8

Total Instructional Hours 192 h

GUIDELINES:

1. A Guide has been allotted to each student by the department. Student can select any topic in discussion with the supervisor. Students should maintain a work diarywere in weekly work carried out has to be written. Guide should review the workevery week and put his/her signature. The work diary along with project reportshould be submitted at the time of viva voce.

2. CA Marks Distribution: A minimum of three reviews have to be done, one at the time finalizing the project title, second at framing questionnaire/identifying the primary data and the third review at the time of commencement of report writing. They should be asked to present the work doneto the respective guide in the three reviews. The guide will give the marks for CIA asper the norms stated below:

First Review	20 Marks
Second Review	20 Marks
Third Review	20 Marks
Document, Preparation and Implementation	20 Marks
Total	**80 Marks**

3. End Semester Examination:The evaluation for the end semester examination should be as per the norms Given Below:

Record work and Presentation	80 Marks
Viva-Voce	40 Marks
Total	**120 Marks**

Note: (End Semester Examination marks jointly given by the external and internal examiner).

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Academic Council
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